Title: How do editors' attitudes and their perceptions of readers' interests combine with other factors to influence the publication of articles on the natural sciences in the *Daily Dispatch*?

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From the Rhodes University School of Journalism and Media Studies

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Abstract

This half-thesis examines how editorial values and perceptions determine the quantity and nature of science articles published in the *Daily Dispatch*, a newspaper distributed through large parts of the Eastern Cape in South Africa. It was predicated on the notion that South African media in general does not cover the natural sciences adequately. In order to test this assumption I decided to investigate the production and publication of science content at the *Daily Dispatch* as a test case.

This study's theoretical framework draws on the normative roles of the media in a democracy developed by Christians *et al.* (2009) and the models of science journalism described by Secko *et al.* (2012) to demonstrate how two parallel conceptions of democracy set diverse journalistic objectives and engender different types of science content. Having applied an essentially political framework, this thesis uses the Hierarchy of Influences Model devised by Reese and Shoemaker's (2014) to explore how an array of forces acting inside and outside the news organisation can shape the publication of science articles.

A quantitative content analysis is used to ascertain the number of science articles published in the first six months of 2014. It investigates which science fields received the most coverage, and how prominently the articles are positioned. As the *Daily Dispatch* does not have any staff dedicated to the science beat, the analysis finds out who produces the science articles that are published. The second phase of this research is a series of interviews with senior editorial staff members aimed at probing the editorial thought processes that determine when and whether specific science stories should be covered. The personal views and biases of the editorial leadership are pivotal to this research because although the newspaper commissioned surveys to determine readership preferences, there were no questions about the sciences. Senior reporters were adamant that they worked for a political newspaper and that as a significant proportion of their readership lived in socio-economically deprived circumstances, they were bound to give priority to articles aimed at improving the lot of their readers. The third phase is a qualitative content analysis of selected articles designed to reveal how science articles are constructed. The final element of this thesis, which ultimately provides an answer to the research question, draws together conclusions from the previous phases to demonstrate the linkage between editorial values and the production of science content.

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Table of Contents

Chapter One: Introduction

1.0 Motivation for thesis

As a lay person with an amateur's interest in astronomy and palaeoanthropology, I had intuitively felt that both print and broadcast media in South Africa were not providing audiences with enough news and information about the natural sciences. The idea to do research on the quantity and depth of science journalism being offered to the general public had been germinating for many years. The decision to pursue this study was not, however, based exclusively on a single person's intuition that something was missing. The inadequacies of South African science journalism had already been raised in a Department of Science and Technology (DST) Ministerial Review Committee which had described science coverage in this country as "fitful and generally mediocre" (DST 2012: 36). Studies at the University of Stellenbosch had also produced research indicating that South African media has not been producing science journalism of sufficient quantity and quality to serve the reading public (van Rooyen 2002: 2-9; Claassen 2011: 352).

I decided to explore these claims further by investigating how much science content is published in the *Daily Dispatch*, what scientific fields are covered, and how newsroom processes affect decisions regarding the publication of science articles. If this research revealed that coverage of the natural sciences in the *Daily Dispatch* was indeed inadequate, the categorisation of articles could assist in narrowing down which particular topics were neglected and identify some that might be well covered. It was clear that interviews with key editorial staff members would be essential components of research aimed at understanding the processes that shape science coverage at the newspaper.

1.1 Research expectations

While this research was still in the planning stages, there was an expectation that it would encounter limited science reporting, but there was no clear idea of what form that reporting would take. I expected there to be astronomy related content as the bulk of the internationally supported Square Kilometre Array radio astronomy telescope had recently been awarded to South Africa and universities in the *Daily Dispatch* coverage area are involved in the planning and construction of this multi-billion Euro project. The anticipation of a substantial

number of astronomy related articles was boosted by an article carried in the first edition of the *Daily Dispatch* in 2014 previewing science news for the year ahead. I was also confident that there would be wide-ranging coverage of palaeontology, as this is one science field where South Africa enjoys some important advantages. Although the main hub of palaeontological research in this country centres on the Cradle of Humankind in Gauteng Province, there are many areas in the Eastern Cape where significant fossil finds are not uncommon.

1.2 Context of the research

This thesis was predicated on the belief that not enough science news is disseminated in the South African media. This position is shared by the South African National Editors' Forum (SANEF 2011) that felt strongly enough about the matter to establish a dedicated steering committee to address its concern. SANEF was one of the main drivers behind the successful initiative to establish Science Communication Chairs at two South African universities. In government, the national Department of Science and Technology is also concerned about the lack of quality science journalism (DST 2012) because it wants the public to support its efforts to increase spending on research and development. Science awareness has been closely linked to the development prospects of a country and preliminary research suggests that there is a positive correlation between science awareness and science journalism. Writing in the *South African Journal of Science*, Reddy *et al.* explain:

> A constructive relationship between the public and science can support economic and social development; it allows the public to be informed about key issues where science and technology may offer solutions to development challenges, stimulates interest in science subjects and careers, encourages investment in R&D[1], and increases public participation in science policy formulation and adoption (2013: 2).

In its Ten-Year Plan for South Africa (2008 – 2018), the Department of Science and Technology (DST) writes that this country's prospects for improved competitiveness and economic growth rely substantially on science and technology (2007: 2). The Ten-Year Plan states unequivocally that science and technology should not be pursued just for their own sake but rather as a means to "help solve our society's deep and pressing socioeconomic

[1] R&D – Research and Development

challenges" (2007: 1) and that in order to achieve these goals, scientists should make a concerted effort to improve their interactions with the rest of society. The ruling African National Congress (ANC) has set a target of spending 1.5% of the country's gross domestic product on research and development because it believes "that science and technology will play a prominent role in the radical socio-economic transformation of South Africa" (Pandor 2014). Government has recognised that in order to receive the required support, the public understanding of science needs to improve and that the media can play a critical role in attaining this objective.

Most South African newspapers do not have science reporters or a recognised science beat in their newsrooms. There are several plausible reasons for this absence including: a shortage of financial resources; editorial policies; a lack of interest on the part of readership or the difficulty in finding suitably qualified staff. A report submitted to the 2011 annual general meeting of the South African National Editors' Forum (SANEF 2011) argued that one of the prime barriers to including more science in mainstream publications was that:

> ... news editors and editors in South Africa are not on board about the value of science news. They should also be trained on the value of science news, not only the journalists. They are the ones who decide on publication. And unfortunately most of them underestimate and undervalue science as news (SANEF 2011).

Even when news organisations recognise the value of reporting on the sciences, George Claassen, Professor of Science Communication and Journalism at the University of Stellenbosch, (2011: 352) maintains that the science editorial staff are not accorded the same status as other desks. Ex-*Mail & Guardian* editor, Anton Harber cited in Ilbury comments on the vulnerability of science desks saying that proper science journalism can be demanding "in terms of time and resources; which, for a newspaper, both equate to cost; so under tough economic conditions, specialist desks such as science are always the first to go" (2012: 04) even though science journalism may be appreciated. Claassen noted that in 2011, "Only one South African newspaper (the nationally distributed *Business Day*), magazine, broadcast station or Internet news site has a structured and organised science desk, managed by a designated science editor with a team of trained science journalists" (2011: 352). In the middle of 2014, the same *Business Day* changed its newsroom structures and its system of designations so that its science and health editor, Tamar Kahn, became a science and health writer for *Business Day* and the *Financial Mail* (Kahn email response, 1 Sept 2014). There

are no other staff members at those two publications working on the science beat. The Afrikaans language newspaper, *Die Burger*, has a specialist science journalist, Elsabe Brits, whose work is also published on Media24 platforms while the weekly *Mail & Guardian* has a full time science editor and is currently the only mainstream newspaper in South Africa with an editor devoted exclusively to the sciences (Roper interview 31 July 2014)[2].

The University of Stellenbosch conducted a three-month survey of fifteen widely-distributed South African publications in 2002 (van Rooyen 2002). Relying on content analysis, the study identified articles that "dealt either directly with an issue of science and technology or with a broad issue for which scientists could provide perspective" (van Rooyen 2002: 9). It found that only 1.8% of the articles in these publications were devoted to covering matters of science and technology, thus serving to confirm the author's premise that South African mainstream media coverage of this sector was inadequate (van Rooyen 2002: 8).While this survey produced valuable results, it only recorded the number of science articles in each publication and did not consider the size nor depth of individual pieces. A broader study by Lugalambi *et al*. (2011) of print media in six African countries - Cameroon, Kenya, Ghana, Namibia, South Africa, and Uganda - revealed that South Africa is not alone in grappling with what is considered to be inadequate journalistic coverage of science matters. It concluded that the media in these countries pay little attention to science and technology and acknowledged that this was at least partially due to "the assumption that there is little audience interest particularly because science and technology are generally difficult to understand both for journalists and audiences" (Lugalambi *et al.* 2011: 6).

1.3 Goals of the research

Surveys referred to above suggest that local readers and audiences are not being provided with satisfactory science news content. To test this claim, this research:

- Categorised and recorded the number of science articles published in the *Daily Dispatch.*
- Evaluated the coverage of science topics according to the normative roles of the media as formulated by Christians *et al.* (2009).

[2] At the beginning of September 2015, the *Mail & Guardian* closed its science desk. Science editor Sarah Wild declined an alternative position in the organisation.

- Assessed the presentation of science content to readership in terms of the four models of science journalism as described by Secko *et al.* (2012).
- Considered interviews with senior members of the editorial staff of the *Daily Dispatch* to probe their views on science reporting.
- Assessed the news values applied to make choices about what science stories should be covered or not.
- Analysed different levels of influence in the shaping of news content at the *Daily Dispatch*.
- Found out whether there is a correlation between the editorial leadership's views on science journalism and the science articles that are actually published.

The *Daily Dispatch* was chosen as the subject of this study as it is widely distributed in the Eastern Cape - a province where high school pupils have done poorly in mathematics and the sciences in recent years according to the Eastern Cape Department of Education Learner Performance Report for NSC 2013 Examinations (2014: 15 – 17). According to the Audit Bureau of Circulations of South Africa, the *Daily Dispatch* is the biggest selling daily newspaper in the province.

1.4 Thesis Outline

This thesis consists of seven chapters. The first explains why I am personally interested in science journalism and describes what motivated me to do this research. It provides the context for the research, highlighting the current state of science journalism in the country. It also outlines the goals of this research and the methods used to achieve these goals. Chapter Two sets up a theoretical framework for the thesis drawing on normative roles of the media in a democracy and the four models of science journalism. Chapter Three continues with the literature review and considers the various levels of influence that shape the publication of content in news organisations. It also focuses on the evolution of the science beat and briefly considers the state of science journalism in South Africa. Chapter Four discusses my methodological approach and choice of data-collecting methods for this research. Chapter Five is dedicated to the presentation of data. It considers the results of a quantitative content analysis of all editions of the *Daily Dispatch* published in the first six months of 2014 and follows up with interviews with the editorial leadership of the newspaper. The Hierarchy of

Influences model, developed by Reese and Shoemaker (1996) is used to analyse the views expressed by senior members of the newsroom. Chapter Six contains a qualitative content analysis of eight science articles published during the research period. One of the articles is a preview of science developments for 2014 while the remaining seven make up a series about red tides that washed along the Eastern Cape shores in January and March. The final chapter draws together conclusions reached in the previous two chapters to consider whether the views on science journalism expressed by the senior editorial staff are congruent with the actual output of science articles. Chapter Seven also contains several recommendations for further research.

1.5 Conclusion

This chapter explains the motivation for undertaking research into the state of science journalism in South Africa and how the research question was derived. It provides an outline for how the research was undertaken and how the results are presented. The next chapter presents a theoretical framework for this thesis.

Chapter Two: Theory and literature review

2.0 Introduction

> Properly conceived, a normative theory of democracy, like a normative theory of the media, explains and inspires (Christians *et al.* 2009: 92, 93).

This thesis uses a four-stage approach to examine how editorial values shape the nature and quantity of science content published in the *Daily Dispatch.* In the first stage, I enumerate and categorise science articles according to a range of attributes and in the second, I examine newsroom decision-making processes. The third stage takes the form of a qualitative content analysis of selected articles and the final stage draws conclusions based on the outcomes of the previous three stages. While it is a fairly straightforward task to quantify the number and size of articles in a publication, it is more complex to define what is meant by elusive terms such as 'enough' or 'adequate' coverage. A discussion on whether any media does enough to cover the sciences can only provide a useful answer if there is a clear understanding about the meaning of these terms as they are inherently subjective adjectives and beg answers to the questions: 'enough science, according to who' and 'adequate in terms of what standards?' Predetermined criteria for this type of benchmark could include quantifiable targets drawn up by the news organisation itself, by advertisers, by government or by the more amorphous requirements of readers - but any specific figure could arguably be seen as arbitrary. This research considers the numbers, but it also looks beyond the numeric benchmarks of science coverage to investigate how and why a regional newspaper such as the *Daily Dispatch* covers the sciences.

In preparation for assessing the *Daily Dispatch's* science coverage, this chapter examines theoretical frameworks applicable to the assessment of journalistic production in a democracy. It identifies two forms of democratic thought as binaries and traces how their diverse interpretations and emphases result in two discrete configurations of democracy: civic republicanism and procedural liberalism. These parallel conceptualisations of democratic thought produce two distinct kinds of media value systems where one confers greater weight on acting in the national interest while the other prioritises the public interest. This chapter shows how Christians *et al.* (2009) built on the two separate types of democratic traditions to describe the four normative roles of the media in a democracy and how these roles can be applied and adapted in South Africa. The greater part of this chapter discusses how the normative roles align with the four models of science journalism as developed by

Secko *et al.* (2012). It also considers how the most recent trends favouring public participation in science policy can be taken forward in the interest of broadening democracy and of making better decisions for citizens.

2.1 Two traditions of democratic thought

Christians *et al.* (2009: 93) identify two broad traditions of modern democratic thought: civic republicanism and procedural liberalism that derive from the French and American revolutions respectively. The civic republican tradition "emphasises the importance of common goals and shared values" (Christians *et al.* 2009: 93) and relies on government to protect the interests of the state. Habermas writes that republicanism requires the primary function of the state to be that of a guarantor of "inclusive opinion- and will-formation in which free and equal citizens reach an understanding on which goals and norms lie in the equal interest of all" (1994: 2). It follows that the civic republican view of democracy presumes that each citizen is fully committed to a civic culture transcending "individual preferences and private interests" (Christians *et al.* 2009: 93) and it expects citizens to vote for the primary purpose of determining the prevailing political will. The procedural liberalism conception of democracy on the other hand, is said to resemble that of a political marketplace where competing interests vie for supremacy and government is required to secure spaces where individuals can pursue their own goals free from external compulsion (Habermas 1994: 2). Procedural liberalism expects citizens to cast their votes based on their own private interests as the democratic processes aggregate citizens' preferences in the election of public officials and choice of policies (Christians *et al.* 2009: 94).

The civic republican and procedural liberal traditions of thought are both resolutely committed to democratic principles yet they uphold divergent models of government. Christians *et al.* (2009: 105) argue that the two models diverge as a result of their differing emphasis and interpretation of essential terms used to describe democracy. While all types of democracy would consider 'equality' and 'liberty' as fundamental elements of their models, there are many different ways of interpreting these two core principles. A model conceived in a civic republican tradition could emphasise the values of 'equality' and give it greater emphasis than 'liberty', conversely, the procedural liberal tradition would confer greater priority to liberty than to equality (2009: 105). Civic and direct models of democracy developed within the republican tradition construe 'equality' as subsuming an egalitarian approach to democracy requiring each person's interests to be given equal consideration and

placing emphasis on the redistribution of resources (Christians *et al.* 2009: 107). A procedural liberal model, with the state taking on the minimalist role of a 'night watchman', understands equality only as a commitment to fair play while the libertarian form of this model is completely averse to any forms of redistribution (Christians *et al.* 2009: 107). This essentially political discussion on democratic traditions of thought is relevant because it has a direct bearing on the application of normative roles of the media and ultimately how these roles apply to science journalism in South Africa.

2.2 Public Interest vs. National Interest in South Africa

The civic republican tradition maintains a vision of the 'common good' as an overriding objective and strives to achieve an egalitarian society where all citizens enjoy equal rights and benefits. Once a democratic decision-making process has determined what is required to achieve the common good, all citizens and institutions as well as government, are required to work in the same direction and are deemed to be acting in the national interest. The procedural liberalism tradition brings about a system with a government that is reluctant to intervene in society. It opens space for individuals and for civil society as well as other segments of society to act in the public interest (Christians *et al.* 2009:93-107). These parallel strands of democratic tradition engender distinct political environments with their corresponding ranges of demands on the media. In the civic republicanism form of democracy, where the common good takes precedence over other interests, the media is expected to work in the national interest. In the procedural liberalism tradition, news organisations are expected to provide information enabling individuals to make their own value judgements without the invasive opinions of news providers. In supplying relevant information to the public, the news organisations are thereby acting in the public interest.

In South Africa, after a brief honeymoon period following the first democratic elections in 1994, the national press has had an increasingly fractious relationship with government (Wasserman and De Beer 2005: 193).While the ruling party, the African National Congress (ANC), and virtually all media organisations in South Africa proclaim their commitment to the principles of democracy, they diverge ideologically about their particular models and have vastly disparate conceptualisations of the media's role in society (Wasserman and De Beer 2005: 197; Fourie 2002: 28 - 30). The media work according to a liberal proceduralism framework in which the 'public interest' is seen as the guiding principle of journalism (Johnson & Jacobs, 2004 cited in Wasserman and De Beer 2005: 197) and government

functions in the civic republican tradition that expects the media to work in the national interest.

2.3 Developing theories articulating the role of science journalists in a democracy

The goals of this research are to investigate how and why the *Daily Dispatch* covers the natural sciences and to determine whether it is doing enough in this regard. It is clearly important to agree on what 'enough' means, and which qualitative benchmarks are to be used in making the above evaluation. It is therefore, useful to examine wider questions about the normative roles of mainstream media before making an assessment of the newspaper's performance in the natural sciences sector. Media organisations operating in a democracy are able to cover the sciences irrespective of whether they are working in the national interest according to the civic republican tradition or the public interest as understood in the procedural liberal view. Methods and emphases in covering science stories can, however, vary considerably depending on which normative roles are pursued. The roles of the media in a democracy and models of science journalism are explored in detail later in this chapter.

Efforts to classify the various roles of the media have produced a wide range of typologies. One of the earliest endeavours in this direction was the influential book *Four Theories of the Press* by Fred Siebert, Theodore Peterson and Wilbur Schramm published in 1956. The authors set themselves the goal of finding out what the press should be, and do, by resolving to answer this question: Why do the mass media appear in widely different forms and serve different purposes in different countries? (Nordenstreng 2006: 35). The *Four Theories of the Press* was widely used as a standard textbook for many years, but by the last decade of the 20th century, media studies academics argued that its outmoded and politicised Cold War outlook was no longer relevant. Recognising that the *Four Theories of the Press* had outlived its usefulness, Clifford G. Christians, Theodore L. Glasser, Denis McQuail, Kaarle Nordenstreng, and Robert A. White wrote *Normative Theories of the Media* in an effort to understand the roles the media have assumed in democracies since the end of the Cold War.

While there is a close linkage between civic republicanism and the national interest on the one hand and procedural liberalism and the public interest on the other, the alignment between these two disparate traditions and the normative roles of the media is more fluid. A news organisation committed to civic republicanism and working in the national interest

would not readily take on the monitorial role of the media, preferring instead either one of, or a combination of, the collaborative, facilitative or radical roles. Conversely, a news organisation working in the public interest according to the procedural liberal tradition would routinely operate in the monitorial role of the media, perhaps sometimes in the collaborative role and on the odd occasion in the facilitative role, but never in terms of the radical role.

Correlation between forms of democracy and normative roles of the media					
Form of Democracy	Media works in the:	Normative roles of the media in a democracy			
		Monitorial	Collaborative	Facilitative	Radical
Civic Republican	National Interest	Weak	Strong	Strong	Strong
Procedural Liberal	Public Interest	Strong	Medium	Weak	None

The purpose of identifying and describing the normative roles of the media is to establish benchmarks against which to measure the performance of the media. Any attempt to articulate the roles of the media should take into account both the empirical and the evaluative aspects of each role. The first aspect consists of the day-to-day tasks that journalists carry out and the second refers to "the purposes or ends to be served and the relative value or importance attached to them" (Christians *et al.* 2009: 119). Counting science articles published in the *Daily Dispatch* makes it possible to quantify the science content in the newspaper, but sheds a pale light on questions of whether the science coverage meets any qualitative editorial objectives or satisfies the needs of the newspaper's readership. An assessment of science reporting should consider which normative roles are relevant and how they are applied in the process used to decide whether or not to cover a science story. Once a decision has been taken to go ahead with a story, similar values should be applied in deciding how the story is treated. Christians *et al.* (2009: 125) highlight "the typical issues and key dilemmas that arise when the press encounters conflicting requirements and value positions in its operating environment" by separating out four normative roles of the media. These roles, described as the monitorial, facilitative, collaborative and radical roles, are widely, but not universally, recognised in the field of media studies today. A decision to publish a story is usually guided by an editorial value system that consciously or otherwise acts according to one or more of the four normative roles of the media. The characteristics of each of the four roles are quite distinct but not mutually exclusive as they can apply individually or together in a range of combinations depending on the subject matter and on the values of a particular publication. As Nordenstreng explains: "A typology does not mean that each concrete case is

placed in one and only one pigeonhole" as a "journalist may represent his or her professional thinking simultaneously in several streams of normative tradition" (2006: 38). Christians *et al.* go further: "Even in the context of a single project or story, the media can shift postures and play more than one role, depending on what practitioners want to achieve and how they want to achieve it" (2009: 217).

Christians *et al.* (2009: 125) examine the functions of journalists in a political context and consequently describe their roles using political terminology even while describing generalist reporting. Nordenstreng writes that the political focus was a matter of choice because "journalism is more clearly and explicitly related to the defence of democracy" (2006: 39). Nevertheless, there does not appear to be any reason why descriptions formulated in political contexts could not apply to coverage in other beats, including the sciences. There are arguably a number of reasons why a newspaper could carry an article about the natural sciences. According to Nelkin, "science journalism should provide three things to non-specialists: it should help people (1) keep apprised of scientific advancements, (2) assess the appropriateness of scientific research and (3) make choices related to perceived personal risks" (1995 as cited in Secko *et al.* 2012: 62). It is improbable that each science story could give equal weight to all three of the abovementioned prerequisites, and some articles might not fulfil either of the last two requirements at all. In the first case, science journalism serves a limited role of satisfying the personal curiosity of readers without having any proximate influence on their lives. The information contained in the article is of little practical value to readers, but some might nevertheless find it interesting or entertaining. The second attribute of a science story – that it should empower the reader to decide whether the scientific research is appropriate or not – provides information linked to the ethics or values of the research. It should answer questions such as: were funds used responsibly; were correct ethical guidelines followed or will this research be relevant to the local community? The third essential element of a science story is that it should provide the necessary information for readers to mitigate or avoid any personal risk. In order to write such a story the journalist would have to meet the requirements of the first two points (Nelkin 1995 as cited in Secko *et al.* 2012: 62).

While Nelkin's explicit vision of what science journalists should do to produce high quality journalism is consistent with the work of some professionals, scholarly criticism tends to focus on the shortcomings of science journalism (Secko *et al.* 2012: 62-63). Frequent and

wide ranging criticisms of science journalism include: uncritical reporting; emphasizing scientific progress and economic prospects; and a lack of appropriate contextual information. Secko *et al.* do not comment on the validity of such criticism, but they contend that the criticism itself has not been able to produce "a clear consensus on what better science journalism would be" (2012: 63). This failure is partly attributed to a lack of a clear articulation on the role of science journalists in a democracy and to inadequately defined and theoretically informed guidelines, news standards and fundamental norms for creating science journalism (Secko *et al.* 2012: 63).

Attempts to develop theoretical models of science journalism have derived from research into the public understanding of science (PUS), a relatively new field of scholarly inquiry that has developed since the 1980s (Brossard and Lewenstein 2009: 12; Secko *et al.* 2012: 63). Current models of science journalism are usually located in two broad categories loosely aligned to the two conceptions of democracy outlined above. The first category is broadly consistent with procedural liberal thought and includes traditional models of science journalism aimed at improving the public understanding of science (Brossard and Lewenstein 2009: 12). It considers the transmission of scientific knowledge from scientists to audiences as its core function (Secko *et al.* 2012: 65; Amend *et al.* 2014:3). According to Asimov, "The traditional practitioner in the field has deeply believed in the need 'to transfer scientific knowledge to those who don't know it'" (1987 as cited in Lewentein 2011: 18).The second, and more modern category of 'non-traditional' models is more compatible with the civic republican tradition of democracy. It values mainstream Western science as well as indigenous knowledge systems and seeks to explore interactions between the public and the scientific community (Brossard and Lewenstein 2009: 12; Secko *et al.* 2012: 66).

Secko *et al.*, recognising that "science journalism has yet to receive a clear, highly supported theoretical articulation in the literature that links theory to practice" (2012: 63), have developed four models of science journalism. Two of these models, the Science Literacy and Contextual Models, focus on information delivery and fall within the traditional category of science journalism. The Lay Expertise and Public Participation Models focus on public engagement and belong in the non-traditional category of science journalism (Amend *et al.* 2014:3; Secko *et al.* 2012: 66 - 68).

The sections below explore the alignments between the four roles of the media in a democracy and the four models of science journalism. In some instances the correlation can

be clear-cut and strong – as for example when a journalist working in the monitorial role of the media writes an article according to the Deficit Model of science journalism. In other cases there might only be a weak correlation such as the collaborative role of the media and the Public Participation Model of science journalism.

Correlation between normative roles of media and models of science journalism					
Models of Science Journalism		Normative roles of the media in a democracy			
		Monitorial	Collaborative	Facilitative	Radical
Traditional	Deficit	Strong	Strong	Weak	None
	Contextual	Medium	Strong	Medium	Weak
Non-traditional or modern	Lay Expertise	Weak	Medium	Medium	Strong
	Public Participation	None	Weak	Strong	Strong

2.4 The monitorial role of the media and the Deficit Model of science journalism

The monitorial role is probably the most widely applied normative role of the media in modern, western democracies. In this role, journalists carry out a wide range of tasks with the overriding objectives of collecting information, verifying its authenticity, writing it up into readable articles and then ensuring it is appropriately disseminated (Christians *et al.* 2009: 139 -157). A science journalist acting according to the monitorial role reports on science news informing audiences about the latest scientific advances making sure to say what it is; who made the breakthrough; where it was made; how it was made; why it was discovered and perhaps even why it is relevant to the audience. Highlighting the narrower watchdog aspect of the role requires the journalist to not merely convey information about the latest findings but also to challenge the methods and conclusions of the scientists. Furthermore, a journalist operating within the monitorial role could also be expected to scrutinise the state's role in developing national science policies, directly funding research and providing incentives for the private sector to commit to research and development. Da Silva argues that as science journalists "...we analyse developments in science, explain their importance and signpost their dangers. But we are more than educators and storytellers. We are also guardians of the public trust, and question science, its operations and its ethics" (Da Silva 2005). An investigative science journalist taking on the responsibility of the watchdog role could reveal

sloppy or unethical research methods or the failure of government to develop science education or alternative and appropriate green technologies.

The content of articles generated by journalists operating according to the normative monitorial role can be of practical value to readers or can serve merely to satisfy their curiosity. Christians *et al.* write that in terms of the monitorial role "some comment and interpretation is appropriate as an offshoot of editorial selection" but that it "is subordinated to representing reality and giving objective accounts" (2009: 125). This broad interpretation of the monitorial role of the media is relentlessly news driven as encapsulated by the slogan of the *New York Times*, a newspaper of record in the United States, which promises readers that it has "All the News That's Fit to Print".

The normative monitorial tradition requires journalists to observe professional reporting codes that would not treat science stories materially differently from other news items. A science journalist working in a newsroom following the normative monitorial role of media in a democracy would find that his or her professional duties are largely consistent with the Deficit Model of science journalism. This model, committed to filling audiences' perceived knowledge deficits, has long been dominant among traditional models of science communications (Secko *et al.* 2012: 66) and is sometimes described as the Science Literacy model because its main purpose is to improve the scientific literacy of audiences. The central tenet of the Deficit Model is that knowledgeable scientists take an active role in communicating science which journalists rearrange and interpret for the benefit of the passive publics (Secko *et al.* 2012: 66). As Lewenstein puts it, "Science in the mass media is usually interpreted in terms of traditional, linear, 'dissemination and translation' models of science communication" (1995: 403). Both the monitorial role of the media and the Deficit Model of science journalism presume that their audiences lack the latest news and information and it is therefore the duty of the journalist to find the facts required to fully apprise readers of the most recent events or developments. One of the key differences between science journalists and other editorial staff working in a monitorial role newsroom lie in the perceived audience understanding of the relevant background to a story. Political, business, sports and most other journalists usually expect readers to understand the wider context of their stories but science journalists do not have that same expectation and therefore feel obliged to add more contextual information than their colleagues (Brossard and Lewenstein 2009: 13).

While the objectives of a monitorial role newsroom and science journalist working within the traditions Deficit Model overlap considerably as their prime goal is to inform audiences, the match-up is far from perfect. They both seek to keep audiences up-to-date in terms of general news, or in the case of the science journalist, in terms of science news. However, journalists performing the functions required of the monitorial role have no further agenda other than to make sure that their news is current and that it is accurate, whereas science journalists operating according the Deficit Model feel they have the additional burden of adding depth to the Public Understanding of Science (PUS). This responsibility has been more or less imposed on science journalists by the science community which includes scientists, business, government and non-government organisations who, for reasons of their own, feel that the general public ought to be better informed about the sciences. In this sense, while still producing content according to the Deficit Model of science journalism, the science journalist is no longer operating solely in terms of the monitorial role, but has also taken on a collaborative function supporting the aims of the wider science community. Fortunately for the science community it is usually very easy to convince science journalists to abandon their strictly monitorial role and take on a more proactive collaborative role because most of them are captivated by science and regard scientists with awe (Nelkin 1987: 24). According to Nelkin, "[T]his attitude of awe and admiration differentiates most science writers from political reporters, who are much more inclined to look critically at the events that they cover" (1987: 24). It is almost as if the science journalist assumes an evangelical role promoting the value of science, or as *Nature* magazine put it – science journalists become no more than cheerleaders for the scientists (Nature 2009: 1033).

The Deficit Model or Science Literacy Model as it is sometimes called, is often criticised for failing to achieve its principal goal of improving the public understanding of science as systematic surveys conducted over periods of decades in the United States and the United Kingdom have shown negligible improvements (Sturgis and Allum 2004:56; Brossard and Lewenstein 2009: 13). Scholars also have reservations about the validity of the model dependent on flawed survey paradigms and about the relevance of surveys that ask questions without providing a context as a means of measuring the public understanding of science (Brossard and Lewenstein 2009: 13). Further criticism has been levelled against this model because the surveys set up unequal power relationships between those who do and those who don't possess the specific knowledge measured by surveys.

2.5 Collaborative Role of the media consistent with Contextual Model of science journalism

A newsroom that is willing to cooperate with centres of power accepts the responsibilities of a collaborative role which usually means that science journalists carry out their duties according to the Contextual Model of science journalism. In certain respects the collaborative role of the media matches the characteristics of the Deficit Model but it is more broadly consistent with the Contextual Model of science journalism which recognises that science means different things in different geographic and social locations (Donghong *et al.,* 2008 cited in Secko *et al.* 2012: 68). A collaborative role for the media requires journalists to moderate their monitorial and routinely critical stance with respect to government, universities, non-governmental organisations, lobbyists and other sources of social power and instead cooperate with authorities in a relationship "built on mutual trust and a shared commitment to mutually agreeable means and ends" (Christians *et al.* 2009: 198). In this role, the media shares common goals with the state and disseminates news and information in accordance with the national interest. It supports patriotic objectives and defends the social order against all threats (Christians *et al.* 2009: 31). The media can collaborate in times of conflict by not publishing information that might be useful to the enemy. It can provide space in newspapers for political leaders to explain their positions or it can generate articles to complement campaigns on issues such as the importance of water conservation or how to prevent communicable diseases. This role is not necessarily limited to cooperation with the state, as in some interpretations of the collaborative role it can imply a close relationship between the media and other centres of economic, intellectual and social power. The collaborative role of the media is consistent with the civic republican form of democracy and closely allied to developmental journalism in its commitment to supporting government and non-government actions, especially in developing democracies. Christians *et al.* believe the collaborative role may be appropriate in new nations, "with their intense pressure toward economic and social development under conditions of scarce resources and immature political institutions" (2009: 127).

A science journalist acting in the collaborative role could work with government, parastatal organisations, private sector entities or non-governmental organisations to publicise worthy campaigns or scientific endeavours. Collaboration often occurs on health matters when government departments appeal to the media's sense of social responsibility to promote

health drives explaining how to prevent communicable diseases such as cholera, hepatitis or tuberculosis. Such articles tend to use scientific research generated by or distributed by state agencies, universities, and government entities to explain how the diseases are transmitted and what can be done to prevent their transmission. Government can also draw on patriotic sentiments to convince media organisations to publish articles advertising local successes and boosting national pride (Alegi and Bolsmann 2013: 01). The Square Kilometre Array (SKA) radio telescope is a case in point where South Africa won the right to host this prestigious radio astronomy project after a fierce competition against arch-sporting rivals, Australia. Local media hailed this success as proof of the country's scientific prowess (Wild 2012: 88 – 92). Science journalists operating in this role have collaborated with environmental groups and health non-governmental organisations as well as large multi-national corporations to explore both sides of the hotly contested dispute on the risks of genetically modified crops. In South Africa, one of the most contentious debates in recent years has concerned proposals to use hydraulic fracturing, or fracking, in the Karoo region. Fracking is a process of drilling and injecting fluid into the ground at high pressure in order to fracture shale rocks to release natural gas below the surface of the ground (Jaspal and Nerlich 2013: 349; Vegter 2012: 23 - 29). Most members of the public do not understand the consequences of such a process so the oil exploration companies have distributed press releases and used science journalists to publish articles arguing that the process provides many jobs, boosts the local economy and has very little impact on the environment (Eggink 2013; Jaspal and Nerlich 2013: 351 – 358). Anti-fracking groups have convinced other science journalists to publish articles showing how the process is extremely detrimental to the local landscape and provides only minimal benefits to the surrounding communities (Vegter 2012: 30 – 41). In this example, where science journalists collaborate with diametrically opposed centres of power, it is difficult to claim a sense of objectivity or balance, so the journalists concerned often succumb to pressure to take sides and produce articles appropriately described as 'advocacy journalism' (Vegter 2012: 39).

The Contextual Model of science journalism stems from efforts to address the contention that the Deficit Model fails to acknowledge the lived context of its audiences (Brossard and Lewenstein 2009: 13). Although the Contextual Model belongs to the traditional category of science journalism models as it employs a 'top-down' information delivery style similar to the Deficit Model, Secko *et al.* write that "it goes a step further by addressing scientific information in specific, audience linked contexts" (2012: 68). Brossard and Lewenstein

recognise the importance of audience contexts explaining that individuals "process information according to social and psychological schemas that have been shaped by their previous experiences, cultural context, and personal circumstances" (2009: 13-14). The Contextual Model is dependent on scientific experts as prime sources of information, but community members and other non-experts can be used to provide background information and context (Amend *et al.* 2014: 03). This model has proven to be more successful in maintaining cooperation between the scientific community and audiences, and research has shown that audiences are able to quickly grasp knowledge that is relevant to them (Secko *et al.* 2012: 68). The public understanding of science is important because a high proportion of scientific research is conducted using public funding. In South Africa, the total amount spent on research and development in the 2012-2013 fiscal year was about R24-billion, or 0.76% of the gross domestic product, with government the largest spender accounting for close to 45% of the total figure (Wild 2014). In a democratic society, a knowledgeable public needs to oversee the decision making process on whether to fund expensive scientific endeavours or not (Perlman 1974: 210).

Some scientists believe journalists should explain new findings to the masses and act as a kind of public-relations service (Nature 2009: 1033) because a lack of adequate knowledge about science is responsible for public scepticism towards modern science and technology. They argue that if scientists provide members of the public, by way of compliant science journalists, with the necessary knowledge to help them overcome this deficit, citizens will have a more positive view of the sciences. The rationale driving the Contextual Model is that scientifically literate citizens who have the required information needed to make decisions in their daily lives are more inclined to support funding proposals put forward by the science community (Dickson 2005; Secko *et al.* 2012: 67)**.** Brossard and Lewenstein defend this argument saying that the primary concern of the scientific community "...has been, since the middle of the 19th century, the lack of intellectual public support for scientific ways of thinking and material public support for scientific work – the funds for research" (2009: 13).

Detractors of the Contextual Model assert that it is merely a more sophisticated version of the Deficit Model (Brossard and Lewenstein 2009: 14). As Donghong writes, while the Contextual Model is more nuanced than the Deficit Model, it shares a fundamental premise according to which "science and society are conceived as two autonomous spheres, distinct from one another, and with one prevailing over the other" (2008: 2 cited in Secko *et al.* 2012:

68). Other critics have observed that the science community can be self-serving when it expresses concerns about the public understanding of science. Bauer writes: "It is suggested that the concern with literacy is correlated with the crisis of legitimacy of 'big science'. To overcome this crisis by literacy assumes a fundamental gap in the operations of literate scientists and an illiterate public, for which there is little evidence beyond elitist prejudice" (2008: 118 - 119). Researchers have also expressed reservations about the value system applied to evaluate the public understanding of science as they believe it is too closely aligned with the scientific community, which almost by definition is an elite group in society. Brossard and Lewenstein add: "The Deficit and Contextual Models often seemed to equate 'public understanding of science' with 'public appreciation of the benefits provided by science to society'" (2009: 14).

2.6 Facilitative Role of the media meets the Lay-Expertise Model of science journalism

Thinking about science journalism in recent years has moved along a spectrum from a one-way to a two-way flow of communication, and from a system focussed on information provision, to one that favours a dialogic approach (Einsiedel 2008: 175; Stilgoe *et al.* 2014: 05; Lewenstein 2011: 18). Einsiedel says this dichotomy has been described as the deficit versus the interactive model of publics "where the former sees publics as empty vessels waiting to be filled with (scientific) wisdom; the second approach views publics as active participants in the science communication process" (2008: 175). She argues that neither approach of the opposing extremes of the spectrum is useful and that "a continuum of participation is more appropriate" (2008: 175). She explains:

> This continuum includes information provision, consultation (where publics are asked for feedback), involvement (where publics participate in the determination of appropriate solutions), and empowerment (where participation extends from defining the problem to determining the solution) (Einsiedel 2008: 175).

In terms of the normative roles of the media in a democracy, the facilitative and radical roles embrace public engagement or a dialogic approach as the basis of their value systems and are therefore consistent with the non-traditional category of science journalism models. The facilitative role of news media is rooted in the democratic tradition of civic republicanism and is bound to promoting deliberative democracy (Christians *et al.* 2009: 158 – 159). Deliberation is the foundation for practical, collective decision-making processes that can

provide the roots for democratic legitimacy (Einsiedel 2008: 179). Media acting according to the facilitative role accept that they have a responsibility to facilitate the processes of deliberation as they share new information, help individuals order their preferences coherently and enable participants to adopt the 'enlarged mentality' necessary to produce public opinion (Benhabib 1998 cited in Einsiedel 2008: 179). Christians *et al.* reiterate that in a deliberative democracy, public opinion is the collective wisdom based on public debate and not an "aggregation of personal preferences" (2009: 158). In this role, the media is expected to support and strengthen dialogue among audiences by providing platforms that allow a broad diversity of citizens to actively participate in the exchange of ideas while clarifying and addressing public problems (Christians *et al.* 2009: 158). It is required to facilitate the process of negotiation over the social, political and cultural agenda so that citizens can engage with one another on both practical matters and social vision (Christians *et al.* 2009: 159). News organisations working within the facilitative role maintain greater distances from centres of power as their objective is not to serve the interests of these powers, but rather to provide citizens with a platform for expressing themselves and participating in the political process.

The matter of accountability is one of the key distinguishing dynamics between the different normative roles of the media. In the monitorial and collaborative roles, a publication can be held accountable to media owners, government or other traditional centres of power whereas in terms of the facilitative role, "the media are accountable to the widely shared moral frameworks that orient the society in which they operate and give it meaning" (Christians *et al.* 2009: 158). Media acting according to the facilitative role provide information about the sciences with a view to empowering citizens to discuss matters of scientific interest and to make informed decisions about related issues. This role has become particularly relevant in South Africa, for example in the national debate about hydraulic fracturing or fracking, and in the worldwide controversy on climate change. Both of these issues have provoked intense discussions based largely on scientific information and interpretation of data that is not usually accessible to the general public (Vegter 2012: 211 – 216). Environmental protection lobby groups, oil companies, readers and other stakeholders have forced media organisations to take on a facilitative role in the fracking and climate change debates by providing relevant scientific information and space for deliberating this information.

The facilitative role of the media in a democracy corresponds closely with the Lay Expertise model of science journalism as they both reject the hierarchical conceptualisation of knowledge transmission from elites to the lay people, and both favour public engagement as a way of sharing information and decision-making. They also implicitly recognise that the notion of science knowledge is itself a malleable concept (Lewenstein 2011: 18). Furthermore, Sturgis and Allum contend that complementary expertise can be critically important to scientific research: "Other knowledges - be it intimate knowledge of working procedures at a nuclear power plant or awareness of the practical political interdependencies between government, industry and scientific institutions - will always be moderating factors" (2004: 58). The Lay Expertise model shares with the Contextual Model an appreciation of the importance of context (Secko *et al.* 2012: 68) but the crucial distinction between the two is that while the Contextual Model retains the hierarchical strata of the Deficit Model, the Lay Expertise model puts both local and scientific knowledge on equal footing. In order to achieve this conceptualisation of parity, greater recognition needs to be accorded to the value of local knowledge, while the limitations and uncertainties of science should be highlighted (Secko *et al.* 2012: 68). According to Brossard and Lewenstein's view of the Lay Expertise Model, "scientists are often unreasonably certain – even arrogant – about their level of knowledge, failing to recognise the contingencies or additional information needed to make real world personal or policy decisions" (2009: 15). The Lay Expertise Model is also home to indigenous knowledge systems in developing countries as their knowledge is validated by social systems rather than the conventions of westernised science communities (Brossard and Lewenstein 2009: 15). The aim of the Lay Expertise Model is to build confidence in local experts so that they can engage on equal footing with mainstream scientists (Secko *et al.* 2012: 69). However critics argue that the model fosters an anti-science ethos favouring local expertise over reliable knowledge of the natural world. They claim that the Lay Expertise Model is driven by political commitment to empowerment of local communities rather than a quest to find true answers (Brossard and Lewenstein 2009: 16).

2.7 The radical role of the media in a democracy and the Public Participation model of science journalism

The radical role of the media is distinct from the three previous roles discussed above in that it is fundamentally oppositional to all hegemonic centres of power. The monitorial and

collaborative roles tend to support institutional power in a society, while media operating within the ambit of the facilitative role can usually co-exist with the prevailing loci of power, but the radical role journalist is unable to tolerate any forms of dominance. The media's primary function according to the radical role is to give a platform to voices critical of established authority, especially government (Christians *et al.* 2009: 179 - 180). It strives for absolute equality between all members of society and considers any disparity in material wealth or concentration of power as an injustice and "insists on the absolute equality and freedom of all members of a democratic society in a completely uncompromising way" (Christians *et al.* 2009: 179). The radical role is sometimes criticised as being impractical because it conflicts with normative codes of professional journalism and with the market forces that determine the financial viability of press institutions. Christians *et al.* reject this argument stating that " ...radical journalism is not inconsistent with professional or market criteria" and hasten to add that "[I]n its fully developed form, however, the radical role cannot be subordinate either to professional norms or to market considerations" (Christians *et al.* 2009: 126). The media in the radical role would not however feel obliged to always accept the more traditional constraints on its operations because "[I]t stems ultimately from social and political purposes that lie outside the range of the press institution" (Christians *et al.* 2009: 126).

The radical role further differs from the other three roles of the media in that, by definition, it retains a partisan position, always with the goal of fundamental or radical change in society (Christians *et al.* 2009: 126). Journalists working according to the other three roles of the media might or might not wish to change the status quo while the radical role always sides with those who are developing forms of resistance and advocacy against the dominant power holders (Christians *et al.* 2009: 180). This role might be particularly difficult under an authoritarian government where its activities would necessarily be curtailed, but in a liberal democratic society "the radical role tends to be fulfilled by a minority sector of the printed press that represents some social or political movements and advocates radical opinions and policies along partisan lines"(Christians *et al.* 2009: 126 - 127). Journalists working according to the radical role are expected to take on a more activist role in society than their monitorial or collaborative counterparts who merely record the facts and perhaps provide some space for populist comment. Radical journalists are required to work for the elimination of concentrations of social power, and to encourage profound changes at the core of existing social institutions (Christians *et al.* 2009: 179).

According to the radical role, the dominant socio-economic powers in society tend to produce a hegemony of the privileged few over the interests of the majority of ordinary people even though the "underprivileged may or may not be concerned about this structural imbalance" (Christians *et al.* 2009: 180). The radical role holds however, that those hegemonic alliances are barriers to participation by the majority of the citizens, and the media must therefore work toward changing of existing social structures. It follows that one of the main tasks of the radical role is to remove the barriers to participatory democracy. This means that "[W]ithout the radical role, participatory democracy would be impossible" (Christians *et al.* 2009: 31). Participatory democracy is evidently a key requirement for the Public Participation model of science journalism which aims to democratise the scientific process (Secko *et al.* 2012: 67). Capurro *et al.* write that in recent decades:

> there has been an increased interest in models of public engagement that seek to involve citizens, scientists, and policy makers in current debates on science and technology policies. These efforts are often viewed as a means to address difficult ethical and social debates, promote education and awareness, and diversify perspectives that seek to inform public policy (2015: 240-241).

It strives to achieve this objective by taking control of science from elite scientists and politicians and empowering public groups to formulate science policies. It encourages public participation in consensus building conferences, citizen juries, deliberative technology assessments, science workshops and deliberative polling as a means of participatory science policy formulation (Brossard and Lewenstein 2009: 16).The Public Participation model fits into the non-traditional category of models and is not therefore exclusively reliant on the dissemination of knowledge from scientists (Secko *et al.* 2012: 69), nor is it dependent on the local experts as would be in the case of the Lay Expertise model. Rather than focussing on the source of knowledge, it seeks to integrate citizens' views in public policy debates as the most appropriate framework for the public communication of science (Brossard and Lewenstein 2009: 16). Prioritising politics and policy issues above the public understanding of science is central to this model of science communication (Secko *et al.* 2012: 69) but it is also the focus of most of its critiques. It is criticised for emphasising the process of policy formation while discounting the actual scientific substance. The Public Participation model has also been undermined by the inherent difficulty of convening large audiences to participate in policy decision making.

2.8 Considerations on developing public engagement

This discussion has shown that the monitorial and collaborative roles of the media in a democracy match closely, but not precisely, to the traditional Deficit and Contextual models of science journalism. Scholars and public policy makers argue however, that citizens are better served when this grouping of traditional forms of journalism is supplanted by a more modern, or non-traditional, alignment of the facilitative and radical roles and the Lay Expertise and Public Participation models of science journalism. The clear divide between these two modes of thinking lies in their relative positions with regard to public engagement and the role of scientists in the process of communicating science (Brossard and Lewenstein 2009: 16). In the first grouping there are few opportunities for members of the public to have their say about science research, and the scientists are the sole arbiters of relevant knowledge. In the second association, ordinary citizens actively participate in deciding which research initiatives are to be pursued and scientists are only one source of many who have expertise that is pertinent to research policies.

Several Western democracies and international organisations currently subscribe to the notion that some form of public engagement is a vital element in the formulation of science policy (Einsiedel 2008: 173; Capurro *et al.* 2015: 240-241). When the United Nations Rio Declaration on the Environment and Development was approved in 1992, it clearly stated in Principle 10 that citizens must participate in drawing up public policy affecting the environment:

> Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. (United Nations 1992)

In the United Kingdom, the Parliamentary Office of Science and Technology (POST) produced a report (POST 2001) entitled *OPEN CHANNELS: public dialogue in science*

and technology about the need to increase public engagement more directly in policy and decision-making. Recalling the traditional Deficit Model of science journalism, the POST reports on "increasing concerns about a widening 'democratic deficit' resulting in a decline in participation in political processes" (POST 2001: 3). It states that the 'democratic deficit' has resulted in a declining trust in authority and expertise, especially in the field of science and technology and cites controversies over mad cow disease, genetically modified foods and medical scandals as recent examples of diminished trust in the so called experts (POST 2001: 3). The report offers two reasons for supporting public engagement: firstly, that it makes democracy more authentic and secondly, that it helps to make better decisions (Einsiedel 2008: 174). This trend has significant consequences for the scientific community in that "its 'licence to practise' can no longer be assumed" because the granting of this licence comes about through processes that include public engagement and dialogue (Einsiedel 2008: 174).

Public engagement trends in the United States have concentrated on making scientists more directly accountable to citizens by obliging them to make government funded research papers freely available to the public (Kaiser 2015: 167). The National Science Foundation (NSF), and the federal agencies that provide the bulk of the USA's basic and applied research funding now comply with a 2013 White House order to make the peer-reviewed papers they fund freely available within 12 months of publication (Kaiser 2015: 167).

Proposals on how the public can take part in science policy decision-making include fairly traditional methods such as questionnaires, opinion polls, and invitations for written submissions (Einsiedel 2008: 174; POST 2001: 3). These methods are generally not very succesful at stimulating enthusiasm nor do they encourage much deliberation between those taking part. The POST report contends that such methods may under-represent social groups such as young people, old people, people with disabilities and those from ethnic and religious groups (POST 2001: 5). For these reasons the Office of Science and Technology and other interested stakeholders have been moving towards more innovative forms of public dialogue using consultation methods that aim to broaden the basis on which policies and decisions are made (POST 2001: 4 - 6). It notes that there are a growing number of public dialogue methods available, the more common include:

- Deliberative opinion polls
- Citizens' juries and panels
- Standing consultative panels

- Consensus conferences
- Internet dialogues
- Focus groups (POST 2001: 4 - 6)

Research into how lay publics cope with deliberative dialogues has found that ordinary citizens not only learn directly about the technical aspects of a subject, but also learn about the social, ethical and economic implications of the science (Nature Biotechnology 2009: 515). It also found that participants feel more confident in their abilities to participate in science decisions and ultimately become better disposed towards scientists and the organisations they represent (Nature Biotechnology 2009: 515). However, in spite of these successes, public dialogues still only reach a small proportion of citizens and while current initiatives toward public involvement are presented as representing democratic reforms and being more inclusionary than in the past, these efforts remain based on the Deficit Model, which research has shown to be unsatisfactory (Nature Biotechnology 2009: 517). There is also concern that in some cases, these deliberative exercises could be disguised attempts to persuade citizens to vote in a particular direction rather than honest efforts at trust building. There is a danger "of this type of public engagement emphasis becoming too conflated with marketing and public relations" (Nature Biotechnology 2009: 517).

The matrix of influences bearing on deliberative sessions are complex and variable making it difficult to achieve consistency in such sessions. It is also challenging, if not impossible, to separate out and assess the relative weights of external pressures to ascertain how they affect the deliberative exercise. Capurro *et al.* (2015: 241–242) identified media representations as an intrinsic component of public engagement processes that had not received adequate scholarly attention when assessing the effectiveness of these efforts. They noted that audiences not only consume media representations, but also interact with them by being selective and generally accepting discourses consistent with their own values. In a series of focus group experiments, aimed at examining how media representations shape public engagement settings, Capurro *et al.* (2015: 240-269) found that members of the public rely on the media for factual information but not for opinion formation. There are many other elements of public engagement that are yet to be examined in greater detail.

2.9 Conclusion

This chapter identified two conceptualisations of democratic thought as binaries and traced how their diverse interpretations and emphases resulted in two discrete types of democratic traditions. The civic republican and procedural liberalism traditions respectively lead to two different kinds of media value systems where one confers greater weight on acting in the national interest while the other prioritises the public interest. Understanding this distinction is relevant because in later chapters this thesis will examine the linkage between the political ethos in the newsroom and the amount of science content published. The greater part of this chapter discussed the four normative theories of the media in a democracy and how they correspond with the four models of science journalism. It also considered how the most recent trends favouring public participation in science policy can be taken forward in the interest of broadening democracy and of making better decisions.

The next chapter examines news values in an organisation and considers five levels of influence on editorial decision making processes. The news values and the editorial decision making processes are pivotal to understanding how the attitudes and perceptions of the editorial staff combine to decide what type of sciences articles should be published and how often that should happen.

Chapter Three: Locating the science beat in space and time

> I like dealing with scientists who like dealing with journalists.(interview with Mike Loewe, *Daily Dispatch* Chief Reporter 2014*)*

3.0 Introduction

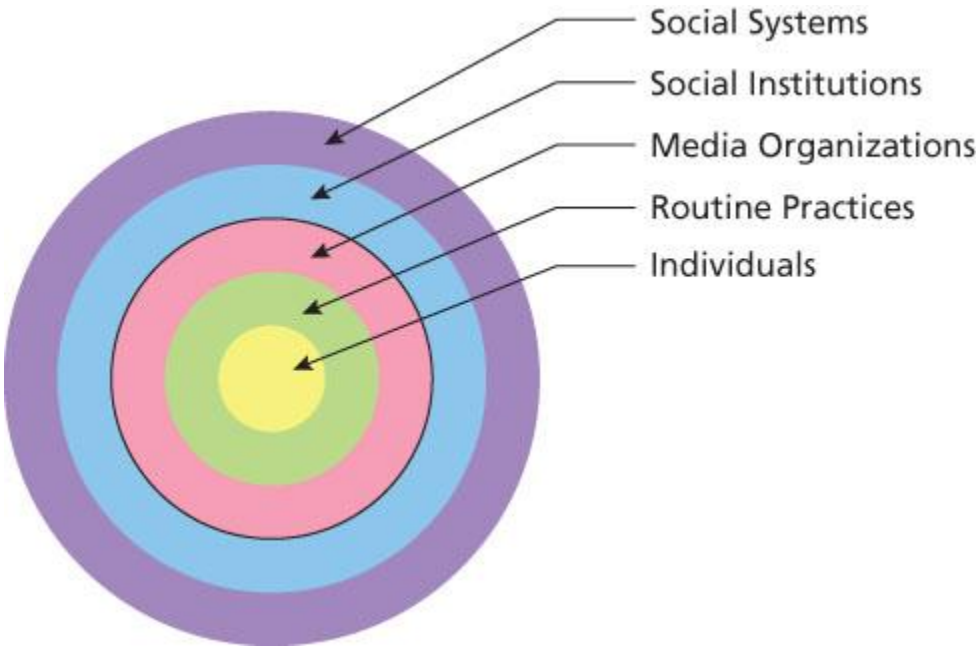
The examination of the civic republican and procedural liberal traditions of democratic thought showed how their divergent political frameworks created specific expectations of the media. Discussion on politically motivated expectations was based on four overlapping, normative roles of the media as described by Christians *et al.* (2009) and on how these roles intersected with the four models of science journalism as elaborated by Secko *et al.* (2012). The current chapter narrows focus from political demands on the media to analyse influences on the newsroom and how they shape the production of science content. The analysis uses the Hierarchy of Influences Model developed by Reese and Shoemaker (1996 and 2014) to present a theoretical framework for the examination of research results in Chapter Five.

The next section considers the unique characteristics of science journalism beginning with the beat system and a brief history of the science beat, paying particular attention to how it has evolved since the first science articles were published in American and British newspapers in the middle of the nineteenth century. This chapter will also consider the ongoing discussion about the often-troubled relationships between the media and the science fraternity. Occasionally this relationship is bitter and antagonistic, but at other times, journalists are accused of compromising the integrity of their work by being too close to their sources. Finally, this chapter will reflect on the debate about the appropriate qualifications for a science journalist, examining whether it is necessary for a science journalist to hold a science degree, or are solid journalistic skills more relevant for this niche profession.

3.1 Social theory - influences that shape journalistic content

This section examines the multi-faceted influences that shape journalistic content and how journalists engage with their professional and social contexts. The sometime idealised vision of dispassionate reporters holding up a mirror to reflect accurate accounts of the day's news for the benefit of their audiences is no longer taken seriously (Tuchman 1972: 660-663; Harcup and O'Neill 2001: 261-262). Some news organisations still aspire to objectivity and

many reporters claim to be nothing more than objective observers, but their understanding of the term is open to a wide range of interpretations (Schudson1989: 264; Tuchman 1972: 664; Reese and Shoemaker 2014: 3). The process of choosing to cover an event or an issue and then producing a relevant article is subject to a myriad of external influences and personal biases of editorial teams working in news organisations (Schudson 1989: 265). The belief that news stories are self-selected, or self-evident, and must therefore be covered, has lost credibility and has given way to research identifying factors that determine which stories will be covered and those that won't (Harcup and O'Neill 2001: 261-262). Researchers have developed a range of taxonomies aimed at organising these factors into theoretical models describing how media content is shaped (Gans 1979; Gitlin 1980 as cited in Reese and Shoemaker 2014: 7-8).



The Hierarchy of Influences Model uses five levels of analysis. Reese and Shoemaker (2014: 9)

The Hierarchy of Influences Model proposed by Reese and Shoemaker (2014: 7-10) uses five concentric circles representing five levels of analysis with the individual reporter as the smallest circle in the centre. The rings radiate outward from the reporter to signify levels of influence on an ever-broadening scale. The ring closest to the reporter symbolises the routine practices of media workers, followed by successive rings for media organisations, extra-media institutions and ultimately the hegemonic ideology in society.

At the core of the Hierarchy of Influences Model, reporters are individuals with personal biases, strengths and weaknesses as well as belief systems that might, or might not coincide with those of the news organisation where he or she works. Reese and Shoemaker (2014: 1 and 2) note however, that editorial staff generally work in organisations that have value systems compatible with their own.

The second level of analysis refers to the routine practices or procedures that a reporter performs to comply with the norms of the profession. Tuchman (1972: 660-678) describes these routines as 'strategic rituals' used by journalists as defence mechanisms to mitigate pressures of deadlines, libel suits and the wrath of their superiors. Routines vary from one reporter to the next, but they usually concern journalistic practices such as contacting reliable sources of stories on a regular basis, checking social media feeds, or providing opposing viewpoints in pieces that contain opinions of newsmakers or commentators. The influences of such strategic rituals on the publication of science content in the *Daily Dispatch* will be examined in Chapter Five of this thesis.

The third ring in the Hierarchy of Influences represents the media organisation that functions according to its particular culture and set of values (Reese and Shoemaker 2014: 10). Each organisation has its own routines established through negotiation between commercial owners and the professional norms of the newsroom. These routines are usually not committed to paper and can be fluid as a consequence of a change of ownership or the natural staff turnover in any media organisation (Reese and Shoemaker 2014: 10). Harcup and O'Neill write that publishing decisions are generally based on ground rules that may not necessarily be written down, but that "exist in daily practice and in knowledge gained on the job" (2001: 1). They found that in order to be selected for publication, news stories needed to satisfy at least one of the following ten requirements: the power elite, celebrity, entertainment, surprise, bad news, good news, magnitude, relevance, follow-up and newspaper agenda.

The fourth level relates to the influences that external institutions and forces can exert on the shaping of news content. Reese and Shoemaker write that "there is a wide variety of influences on media content that operate outside of the media organisation" (1996: 210). These external influences can generally be traced back to special interest groups, market forces or government institutions. In the case of science journalism, the relevant external organisations are usually universities and other academic institutions. Later in this chapter I

deal with the relationships between science journalists and scientists and in Chapter Five of this thesis, senior reporters at the *Daily Dispatch* describe their interactions with researchers at universities in the Eastern Cape.

Finally, at the ideological level, represented by the outermost circle of the Hierarchy of Influences Model, professional values and practices must be consistent with the prevailing power structure (Reese 2007: 36). For example, media content produced from within a capitalist system will be subjected to different pressures from those exerted on content generated in a society where socialist ideology holds sway. Reese and Shoemaker explain that ideologies are not imposed directly "but are constituted by the institutional, occupational, and cultural practices that make up the mass media" and that "... ideology happens as a natural outgrowth of the way the system operates, making it a true, societal, macro-level phenomenon with which to conclude our Hierarchy of Influences" (1996: 242).

The levels of analysis laid out in the Model are dependent on human behaviour and are therefore dynamic. At the level of a single reporter, there is only the behaviour of a single individual to consider, but at each successive level, the influences are exercised by a greater number of individuals. The people might be part of an institution or a movement, but Reese argues that these structures "are abstractions that only become visible when we name them and begin to look for regularities" (2007: 36). At the core of this perspective is what Reese describes as the "interplay between structure and agency, between actions people take, but not under conditions of their own making. They participate in a conversation that began before they arrived" (2007: 36 and 37).

3.2 Newsroom beat systems

The news organisation itself occupies the third, or middle ring in the Hierarchy of Influences and it is in the newsroom that these influences converge. In an effort to manage these diverse influences, most news organisations around the world, including the subject of this thesis, the *Daily Dispatch*, maintain some sort of beat system. Before the early newspapers adopted the beat system, the concept of a beat was defined in geographical terms and was used in the study of natural history to describe the routines of wild animals and boundaries where man comes into contact with nature (Dick, 2012: 754). The beat system was seen as an attempt to impose order, an objective retained even as later definitions broadened geographical classifications into a much wider range of subject matters. It was also seen as a way of

matching journalists' skill sets and network of contacts with their reporting duties. Newsrooms usually work with beats because it is believed that the system is constantly improving as each reporter builds expertise in a particular subject matter. This knowledge is usually acquired through expanding a network of relevant contacts and developing personal relationships with people and organisations as potential sources of editorial content. Meyers (1992: 81) explains that as every beat is unique, each one requires specific work routines and practices that are individually tailored to the particular activities of that beat's domain. The news-gathering routines help journalists plan their daily tasks and arguably improve their general efficiency, but these benefits come with certain drawbacks (Dick 2012: 755; Tuchman 1972: 660-662). The journalists develop a dependency on bureaucratic organisations and other 'official' sources thereby running the risk of reducing the scope of news coverage and compromising efforts at impartiality. However, Dick argues that, "[b]ehind the ritualisation of sourcing lies a series of consensual and mutually affirming processes, whereby both journalist and source have much to gain" (2012: 755). Meyers (1992: 81) acknowledges that job requirements and relationships with sources can lead to a conflict of interest between the sources and journalistic deontology which implicitly requires that reporters maintain a professional distance from their sources and subject matter.

In this context, journalists take on a collaborative role of the media, working with their sources of news and information instead of reporting on what they do or say. Science journalists collaborate with newsmakers and develop symbiotic relationships with them for fear of alienating what might be regular and reliable sources of content. This kind of mutually beneficial collaboration is particularly true in the case of science journalists who tend to gravitate towards the science niche they are most interested in and encounter scientists they admire. It is therefore not unusual to find science journalists sharing the objectives of the scientist in disseminating a preselected angle on a new scientific development. This particular type of collaborative reporting might not be in accordance with the editorial policies of the news organisation where the journalist works. It could also impinge on the journalist's ability to approach science news from a monitorial point of view which would require the journalist to adopt a watch-dog role and to ask hard questions. Western journalistic ethics require today that journalists maintain a distance from possible sources of information, but this requirement was not always emphasised. Rensberger (2009: 1056) cites the case of William Laurence, a well-known, American reporter in the 1940s who openly wrote press releases for the US war department at the same time as he was reporting on the development of the atomic bomb for

the *New York Times*: "Incredibly, Laurence's government job was not kept secret, nor did it seem to strike anyone as the massive conflict of interest that journalists today would see" (Rensberger 2009: 1056).

3.3 Evolution of the science beat

Mainstream newspapers covered the natural sciences from the middle of the nineteenth century seeking to print articles that were largely comprehensible by an educated, but not necessarily expert reader (Weigold 2001: 173; Nelkin 1987: 17 - 18). At that time it was not unusual for the more erudite members of society to attend open discussions organised to enlighten the public about new developments in science and also to shed light on topical controversies. An example of such a discussion was the storm surrounding Charles Darwin's *On the Origin of the Species* which sparked heated debates in the Royal Society (Browne 2003: 244 – 247). That kind of debate was an opportunity for scientists to engage directly with the public without the intervention of the media, even though the newspapers would soon afterwards report on the events for the benefit of the lay public. The journalists would be acting in the monitorial role of the media, and according to the Deficit Model of science journalism because they would simply report on what happened at these debates without attempting to encourage any further public engagement.

It was also a time when innovative minds were rapidly producing new discoveries to patent them quickly and to make as much money as possible (Lamoreaux and Sokoloff 2001: 39 – 41). In the United States, inventors such as Benjamin Franklin and Alexander Graham Bell filed hundreds of patents throughout their lifetimes while on the other side of the Atlantic, Charles Babbage, Lord Kelvin, Guglielmo Marconi and George Stephenson were coming up with new discoveries at a steady rate (Khan and Sokoloff 2007: 6). News organisations all over the world made it their business to report on circulation-boosting discoveries as often they could. Newspapers reprinted the full text of lectures of renowned scientists such as Thomas Huxley, Louis Agassiz, and Asa Gray (Weigold 2001: 173) and in 1872, the *New York Tribune*, published John Tyndall's physics lectures in a special edition that sold more than 50,000 copies (Nelkin 1987: 17). Most of the science reported on in the nineteenth century had practical applications for agriculture as well as information about the latest home remedies (Nelkin 1987: 17). It also had more to do with technology than pure science as it was the technology that made the articles relevant to its readership. The monitorial role of the media still reigned supreme as newspapers reported what the voices of authority had to say

and if there was any collaboration, it was more likely to be in the interests of the business community. Assessing how reporting of that era conformed with Secko *et al.*'s models of science journalism, it appears that it was largely compatible with the Contextual Model, relying exclusively on the voice of authority to make up for the knowledge deficit among readers, but also taking cognisance of the audience's context. The media therefore explained to readers how the latest technology would make their lives easier.

In the early decades of the 20th century, scientists found they had less time to popularise their work as their respective fields became more competitive and at the same time more specialised. They were also under growing pressure from their peers to distance themselves from the general public and leave the science communication to the journalists (Dunwoody 2004: 79). Readers were finding it increasingly difficult to keep up with scientific discourse even though "[a]s recently as 1920, the language used in a journal such as *Nature* would be comprehensible to literate audiences and would not sound dramatically different from other forms of literature" (Weigold 2001 : 173). The gap between scientists and the general public widened such that "[s]cience seemed increasingly fascinating but obscure, powerful but somewhat dangerous as well" (Nelkin 1987: 17). Although scientists sporadically wrote articles for newspapers, science writing was a virtually unknown specialty in journalism until the 1930s (Perlman 1974: 212). In the United States, the National Association of Science Writers (NASW) was conceived during the annual meeting of the American Philosophical Society in Philadelphia in 1934 (Perlman 1974: 212). The association was formally incorporated in 1955 with a charter to "foster the dissemination of accurate information regarding science through all media normally devoted to informing the public" (NASW).

The space race in the 1960s lit up the public imagination stimulating the general public to take an interest in the sciences, particularly astronomy. The interest was so great that in the United States, most large news publications had not only a science beat reporter, but also a specialised space reporter. Some of these space reporters were assigned to spending large amounts of time at Cape Canaveral and virtually became 'embedded' reporters (Clark and Illman 2003: 22). The world received almost all of its information on the 'space race' from the United States, and South Africa was no exception. South African newspapers reported on the drama as well as the science of the space race.

At that same period, South African newspapers had an additional science story that provided a great deal of news content. In 1967 Prof Chris Barnard performed the world's first human

heart transplant. This breakthrough put South Africa at the forefront of the world's cardiology sector filling South Africans with pride at the achievement and at the same time spurring a greater interest in innovative medicine and cardiology in particular (Hoffenberg 2001; Cape Times 1997). As the interest in space exploration and medicine grew, so the South African newspapers increased their coverage of the sciences. There was no television service in South Africa until the SABC commenced test broadcasts in 1975 with the first official news bulletin going on air on 5 January 1976 (South African History Online).

The largely positive and enthusiastic stories about the sciences in the 1950s and 1960s gave way to more distrustful outlooks as the world contemplated the failure of science to find a cure for HIV/Aids and the debate on climate change gave rise to the view that scientific opinion could be bought by the highest bidder (Vegter 2012: 236 - 240). Claassen (2011: 351) writes that in the past two decades, print and broadcast media have steadily reduced their science reporting. The number of newspapers in the US newspapers featuring weekly science or science-related sections shrank by nearly two-thirds between 1989 and 2005, from 95 to 34 (Mooney and Kirshenbaum 2009: 6 as cited in Claassen 2011: 351).

The broad international trends of diminishing coverage of the sciences in the press appeared to have been mirrored in South Africa, but Van Rooyen notes that "[v]ery little literature could be found on the trends in the South African press" (2002: 08). The lack of articles on the sciences coupled with a poorly documented history of local science has prompted Joubert to write that "South Africa's history of science needs to be researched and recorded to include not only Western science but also the roots of indigenous knowledge" (2001: 330). Currently most science stories published in the mainstream press are about the medical sciences or the environment (Claassen2011: 351; Weigold 2001: 167; Dunwoody 2008: 17 - 18). Research conducted on the *Daily Dispatch* in the first six months of 2014 for this thesis supported the above conclusions that health and environmental articles are the most common subject matters of science related articles.

Health reporting has been a prominent aspect of science journalism since the nineteenth century, but articles about the environment are relatively new as a stand-alone beat. Clark and Illman (2003: 22) write that in the early days, articles about the environment did not fit easily into any of the existing beats so environmental stories were included in the coverage of politics, business, health, the outdoors, science, or consumer affairs. This piecemeal approach may have "hindered the growth of public awareness of one of the fundamental tenets of

environmentalism: that everything is connected to everything else" (Clark and Illman 2003: 22).

3.4 The science beat today

Addressing the World Science Forum in Budapest in 2005, the president of the World Federation of Science Journalists (WFSJ) Wilson da Silva, stated that the role of science journalists has never been more important: "We live in a world at a time when science is extraordinarily powerful; when technology is bringing dramatic changes to the daily lives of millions around the world; but also at a time when science is often as much a commercial enterprise as it is conducted for the greater public good" (Da Silva 2005).

Newsroom understanding of beats in general, and the science beat in particular, is not standardised. There are many different interpretations of what the science beat is, what it is supposed to cover, how it is expected to perform and even what the definition of science is. Weigold (2001: 165) notes that science is generally used to include the work of academic scientists who seek knowledge for its own sake (basic science) as well as the activities of those who explore solutions to immediate problems and concerns (applied science). He notes that, "A broad definition of science might include technologists who use fundamental knowledge to develop and design new products, whereas a narrower definition would exclude this group" (Weigold 2001: 165). In March 2009, the British Science Council, an umbrella organisation of science societies and professional bodies, announced that it had spent the previous year working out a new definition of the word 'science': "Science is the pursuit of knowledge and understanding of the natural and social world following a systematic methodology based on evidence" (British Science Council 2009). Almost immediately, several prominent scientists pointed out shortcomings[3] of this definition so that the year-long effort designed to resolve differences of opinion fell short of its ultimate goal (Sample 2009).

Difficulty in defining science can be added to the challenges entailed in describing the science beat that is sometimes conflated with technology and especially with information technology (Weigold 2001: 165). If a reporter has been assigned to the science beat, should

[3] The definition was criticised for not excluding pseudo-sciences or creationism. David Edgerton, professor of the history of science and technology at Imperial College, said that it defines science as a pursuit related to the creation of new knowledge, rather than established knowledge itself. He added, "The definition would include historical research and indeed some journalism! It does not demarcate something called science from the humanities" (Sample 2009).

he or she be expected to cover technology stories as well? This applies to articles that might use advances in science to build a new type of solar energy cell or that highlight a new microchip enabling manufacturers to build faster laptop computers. The nexus between science and technology is underlined by the name of the South African government's Department of Science and Technology. The health sector can also blur lines between the science and its applications in research programmes. To illustrate this problem, it is easy to accept that the development of a new drug to combat HIV/Aids falls within the ambit of the sciences. It should still fall within the sciences when assessed in a comparison test with placebos or in clinical trials, but it is debatable whether the product is of scientific interest once it is distributed on the open market. The challenge inherent in defining 'science' was a key challenge in identifying science articles for this research.

3.5 Fraught relationships between scientists and science journalists

The relationships between science journalists and their prime sources of information are in several key respects different from those of the other traditional beats. In most mainstream news organisations, where the political desk reigns supreme, senior political reporters are able to fully comprehend political arguments and confront politicians head-on in open debate. Sports writers can, and usually do, freely criticise the strategies and performances of sports personalities because they understand and sometimes influence these strategies. Business journalists are required to report on the latest developments and trends and then often feel the need to share their suitably informed opinions with their audiences. In most cases, journalists deal with newsmakers on a basis of more-or-less equal footing. This is not usually true for science journalists where the scientist is the producer and custodian of knowledge. A scientist who has completed his or her PhD in a particular specialisation along with possibly several years of postdoctoral study will invariably have a vastly superior knowledge about that specialisation than a journalist who might have read one or two magazine articles about the subject. The knowledge gap, or deficit, between the scientist and the journalist characterises an awkward relationship where the scientist has to convey information about a new breakthrough to a journalist who then has to satisfactorily translate the explanations into a newspaper article or a broadcast piece. This situation makes the professional life of science journalists difficult "as they confront audiences on one side, scientists on another, and the traditions of the media in the middle" (Perlman 1974: 211). The possibilities of the journalist

making mistakes or glossing over critical details while trying to make the article readable for the lay public are great.

Reed (2001: 286) says that power embedded in social relationships rather than a purely hierarchical construct is key to understanding the balance of power between scientists and journalists. This balance of power is ostensibly heavily weighted in favour of the scientists but they often feel that they could be jeopardising their careers when speaking to the media. Reed writes:

> Scientists think the 'lowly journalist' can destroy their reputation and are afraid of what their colleagues will think about them based on what journalists write. However, it is the power of science as a key discourse and institution of modern society that is central to understanding the dissatisfaction with media reporting of science (2001: 286).

Journalists are sometimes censured for their inability or their reluctance to report critically on the sciences. This failing can be attributed their lack of relevant scientific knowledge or to their close relationships with scientists who are their primary sources of newsworthy information. Journalists who cover the sciences generally do so because they are fascinated by at least some aspects of the subject matter and they usually have a fair amount of admiration for scientists. The existence of this deep-seated respect is often cited as an explanation for the lack of critical science journalism. Murcott explains that:

> [j]ournalists are of course trained to stand back and provide a critique, including context and a broader perspective, rather than simply reporting what they read in a press release. But doing so is a particular challenge for science journalists (2009: 1054).

Scientists often demand the right to inspect copy of an article about their work before it is printed. The demand can be made simply to check the facts of the story, but Reed (2001: 288) argues that scientists tend to believe that their work should be presented exactly as they would. She writes that scientists have a profound sense of ownership over all aspects of their work and given the opportunity, would disregard journalistic conventions such as the requirement for brevity and would "expect full recognition for all members of the research team, institution and funding source regardless of how many of each" (2001: 288). The call

for fact checking is a contentious point that can lead to a breakdown in relations between scientist and journalist. Many news organisations prohibit the practice of allowing a news source to examine copy before it goes to print. Scientists argue that they have a vested interest in the accuracy of the article and therefore claim the right to verify content attributed to them. The counter argument is that given the opportunity, a news source, in this case a scientist could abuse this right to check facts by changing the approach and/or emphasis of the article. Perlman explains however, that in many cases, a journalist might welcome the opportunity to have his facts checked,

> If the story is complex and technically difficult (and deadlines permit), I am eager to have a scientist's help in checking the facts in my account. I may show him my piece, or read it over the phone, but always with the most careful prior understanding that only the facts are at issue, never my personal interpretative comments, my emphasis, or my writing style (1974: 214).

Dr Robert Gess, an evolutionary studies scientist based in Bathurst in the Eastern Cape (whilst a postdoctoral fellow of Rhodes University and of the South African Centre of Excellence in palaeontology) provided an illustration of how a mistake of relatively small consequence to a journalist can cause great distress for a scientist. In August 2013, he announced the discovery of a scorpion fossil (*Gondwanascorpio emzantsiensis)* outside Grahamstown and told journalists that the discovery was of great significance because it was 360 million years old. A journalist wrote a positive story about the find but mistakenly said it was 350 million years old and this incorrect version was picked up and republished in many print and online editions of news organisations all over the world. While the difference of ten million years might be of little consequence to the general public, Gess explained that as there was a significant extinction event 358 million years ago, the incorrect figure placed the fossil in the Carboniferous Period instead of the Devonian Period – a serious inaccuracy in the eyes of his peers (Interview with Dr Robert Gess, 4 Sept 2013).

It can be difficult when scientists believe that their work should be presented exactly as they would because even if there is no dispute about the content of the article, there can be considerable disagreements about how the research is framed. At the core of these disagreements "is often a fundamental disconnect between how scientists and journalists interpret and describe the research process" (Nature Biotechnology 2009: 516). Scientists produce papers based on their research for the benefit of a narrow specialist audience,

whereas mainstream journalists prefer to write humanised accounts aimed at connecting with as many lay readers as possible. A journalist would intuitively seek out personal accounts from scientists or from individuals who might be affected, in a negative or positive way, by the research. In competition with other news of the day, stories that do not have the human element are less likely to be published (Nature Biotechnology 2009: 516). The relationship between scientists and journalists is one of mutual dependency because the science journalist needs the scientist to provide material as almost all science related articles require scarce knowledge and a voice of authority to give credibility to a story. Scientists have come to understand the value of public visibility as they have grasped the positive correlation between media coverage and their ability to obtain research funds (Dunwoody 2004: 76). So while scientists run the risk of having their work misrepresented or misunderstood in mainstream media, they can benefit from easier access to research funding, and from the social legitimacy conferred on them by media coverage. Reed (2001: 286) writes that some scientists try to use the media to 'have power over' other scientists while Dunwoody (2004: 76) claims that media attention can make some scientific work appear to be more important than other work not only in the eyes of the public but also in the eyes of other scientists. Dunwoody cites a study of *New York Times* coverage of research published in the *New England Journal of Medicine* where "scholars found that media attention apparently enhanced the importance of research in the eyes of other scientists working in the same specialty area" (2004: 76).

In spite of the possible abovementioned benefits that can be derived from working with journalists, "[m]any scientists, however, still flatly refuse to cooperate with reporters - some because they have in fact been misquoted or misinterpreted in the past; others because they mistrust the press generally; still others because they really do cling to the outmoded idea that science is none of the public's business" (Perlman 1974: 214 - 215). A constructive relationship between science and the media is not unusual, but Reed argues that the opposite is more often the case: "It is well known that tension and conflict exist between scientists and journalists about the reporting of science" (2001: 279). A desire to overcome the evident antagonism existing between scientists and journalists in South Africa was the motive behind two workshops held at the University of Stellenbosch, in November 2011 and November 2013. The workshops entitled *Science meets the Media in Stellenbosch I* and *II* respectively aimed to bring scientists and journalists together in an attempt to reach a meeting of minds so that ultimately the general public would be better served. The workshops were funded and promoted by the South African National Editors Forum (Sanef), Stellenbosch University's

Journalism Department and the South African government's Department of Science and Technology (DST) thus indicating a broad interest in addressing a weakness in local science journalism. Scientists and journalists acknowledged the flaws in their relationship and both sides worked hard to repair, or at least narrow the fault lines (Lang 2013: 12).

3.6 The cycle of hype – entertainment as a news value

If scientists and journalists often clash over matters of style, and occasionally over substance, the two professions are not alien cultures. They are both built on the same foundation - the belief that conclusions require evidence; that the evidence should be open to everyone; and that everything is subject to question (Nature Commentary 2009: 1033). One of the key points of divergence is that while scientists are professionally trained to be cautious in describing their work, journalists are expected to search for the extraordinary. Scientists want to be right, while journalists want to be read (Lang 2013: 12). After all, people don't read newspapers with the expectation of finding the ordinary. Journalists are often accused of manipulating the facts to make them seem more dramatic, and it is this perceived tendency that "many scientists, ethicists, policy makers and government officials see as the primary shortcoming of the media" (Nature Biotechnology Commentary 2009: 516). Studies have shown however, that despite an enduring perception that the media is the main source of inaccurate claims about science, the hype in popular media cannot always be attributed to journalists. In some cases the importance of research results is exaggerated as a result of a "more systemic problem associated with the increasingly commercial nature of the research environment" (Caulfield 2004: 337). Commentary in *Nature Biotechnology* observes that, "hype in the media is most likely to originate with researchers using metaphors associated with breakthroughs when in reality their research is one more incremental piece of complex scientific endeavour" (2009: 516). Many scholars believe that the media, scientists, the public and other interest groups can become complicit collaborators in generating a cycle of hype (Caulfield 2004: 338; Nature Biotechnology Commentary 2009: 516). George Claassen blames both the media and scientists for the poor public understanding of science. He finds fault with the media, "because they quite often do not understand scientific research as a long process with preliminary findings" and with the scientists "because they do not communicate the intricacies of research findings in a proper, direct way with science journalists, but rather work through secondary channels or media liaison officers" (2011: 355).

Mainstream media organisations often consider serious science to be boring and of little interest to their readers. For this reason, when reporters are assigned to a science story they are encouraged to look for angles to make their story fun or entertaining. A senior sub-editor at the *Daily Dispatch* said that she starts "out with the assumption that people are not really interested, and that they are really busy" (Stent interview 16/07/2014). She therefore selects only science stories that she is really interested in, and then sees it as a challenge to implant her excitement in the articles, "to share it, otherwise no one is going to read it". She praised her colleague David Macgregor for his flair in writing science articles noting that "[h]e really likes the wackiest angle and he knows how to tell a good story in a fun way" (Stent interview 16/07/2014).

The notion of 'making science fun' is entrenched in many news organisations, science festivals and science centres established in this country with the purpose of making science more accessible to the general population. That such a perception exists, and is rarely challenged, enhances science journalism's claims to being a unique beat. Reporters are almost never sent out on a political, business or court story with the admonition to make their stories 'fun'. The presumption that audiences will only read a science article if it is entertaining means that most contemporary science journalism falls under the category of 'infotainment' (Rehman 2013). The information part of the article usually consists of some background to the scientific study, a summary, the key findings, and then a description of the significance and implications of the research. Rehman writes:

> The entertainment component varies widely, ranging from an enticing or witty style of writing to the choice of the subject matter. Freaky copulation techniques in the animal kingdom, discoveries that change our views about the beginnings of the universe or of life, heart-warming stories about ailing children that might be cured through new scientific breakthroughs, sci-fi robots, quirky anecdotes or heroic struggles of the scientists involved in the research – these are examples of topics that will capture the imagination of the intended audience (Rehman 2013).

While there is nothing inherently wrong with science journalism being well-written and entertaining, it runs the risk of trivialising the science behind the story using pre-digested factoids to convey the message (Ilbury 2013: 19). Scholars lament that on occasion, while trying to write entertaining pieces, science journalists tend to uncritically accept content found in peer reviewed articles (Rehman 2013; Caulfield 2004: 337). General reporters

routinely find multiple news sources to confirm a fact or a new development as editors strive to avoid publishing 'one-sided' or plainly incorrect stories. It is generally thought of as sound journalistic practice to have at least two sources for each issue or discussion point in a story and if the topic is particularly controversial, the editor might insist on a range of views before publication. Science journalists often fail to get more than one opinion on a story because they either cannot think of anyone who could comment on specialised niche, or they believe that any research published in a peer reviewed journal must be accurate. As Rehman notes, "The peer-review process is equated with a 'fact-checker' role" (2013).

The normative journalism requirement that all stories should be balanced by giving equitable column space or air-time to opposing points of view on a controversial topic can be problematic for editorial decision makers. Examples of such difficult topics in the sciences include: genetically modified food; vaccinations and possible links to autism; evolution never happened or climate change is nothing but an elaborate hoax. The BBC Trust decided in 2010 to review the accuracy and impartiality of its science coverage when it found itself embroiled in a controversy about its attempts to report on climate change impartially. Some commentators complained that the BBC was not giving equal coverage to both sides of the climate change debate while other critics insisted that the broadcaster should not give equal time to climate change denialists. The BBC Trust commissioned Steve Jones, Emeritus Professor of Genetics at University College London, to conduct a review of the BBC's accuracy and impartiality in science coverage, and thereafter to give an account of his findings to the Trust. In his report back, Jones noted (2011: 69 – 70) that more than 90% of scientists surveyed agreed on the anthropogenic origins of climate change thereby implying that the denialists did not deserve equal times with the majority. Jones remarked that "[t]ruth is not defined by opinion polls but it is difficult to deny the consensus" (2011: 70). In order to meet the expectation of impartiality, Jones invoked (2011: 75) the principle of 'due impartiality'[4] for situations where the requirement for absolute neutrality would not reflect the needs and opinions of the public.

[4] Due impartiality is set as a requirement in several documents accompanying the current version of the BBC's Charter. Section 4 of the BBC's Editorial Guidelines defines 'Due impartiality' thus: The term 'due' means that the impartiality must be adequate and appropriate to the output, taking account of the subject and nature of the content, the likely audience expectation and any signposting that may influence that expectation.

3.7 Who is qualified to be a science journalist?

A discussion on science journalism can often include the question about whether a mainstream news organisation even needs specialised reporting staff to cover the sciences. In recent years the shift from traditional forms of broadcast and print news media to digital platforms coupled with the worldwide financial crisis in 2008 have greatly increased financial stresses on news organisations. Allan (2011: 03) writes that when newsrooms are under pressure to cut costs, specialist reporting such as science news becomes expendable. When budgets have to be trimmed then science news can appear to be a luxury that is "increasingly difficult to justify when certain other types of news will be both cheaper to produce and more popular with audiences (and thus advertisers)" (Allan 2011: 03).

However, if an organisation has acknowledged the need for a science reporter, it should then determine what kind of qualification the reporter ought to have in order to be able to perform his or her duties properly (Weigold 2001: 166 – 170). When recruiting a science reporter, does the news organisation look for a scientist who can write conventional news copy or is it better to hire a professional journalist who is capable of understanding cutting edge science? This dilemma can be reduced to a simple question: Is it preferable to hire a science journalist with a science degree or a journalism degree? It can be argued that an individual with both types of qualification would be ideal, or perhaps a person who has graduated with an advanced degree in science journalism might be even better. Currently there are few academic institutions in the world that offer science journalism courses at a degree level and there are also not many individuals who have both science and journalism degrees.

3.8 Conclusion

This chapter built on the theoretical frameworks of the normative roles of the media and the four models of science journalism to explore the various influences at play in the newsroom. It reviewed the Hierarchy of Influences Model that provides a theoretical framework to understand the range of influences from within and from outside the newsroom that ultimately give shape to journalistic content. The analysis of data in Chapter Five will draw on this model. We have also seen how the science beat evolved in newsrooms of western democracies from the early editions of the nineteenth century that shared practical information on how to cope with everyday challenges to covering the space age and the rapidly changing journalistic paradigms of the twenty-first century. This chapter includes an

examination of some of the unique problems faced by science journalists and the organisations employing them as well as the tensions between scientists and the journalists who report on their work.

Chapter Four will present the research methodology applied in this thesis. It will discuss the research design and how it was applied to enumerating the science articles published in the *Daily Dispatch*.

Chapter Four: Research Methodology

4.0 Introduction – a study in four phases

The aim of this thesis is to determine how editorial values shape coverage of the natural sciences in the *Daily Dispatch*. The strategy designed to achieve this goal consists of four essential elements. The first is a quantitative content analysis intended to provide information on how much science content was published, what specific fields of science were preferred and who produced the articles. The second element consisted of a series of interviews with senior editorial staff members of the newspaper aimed at probing the editorial thought processes that determine when and whether specific science stories should be covered. The third was a qualitative content analysis of selected articles designed to reveal the constitutive components of their content. The final element, which ultimately provides an answer to the research question, draws together conclusions from the first three elements to analyse the linkage between editorial values and the production of science content.

4.1 Research Design – methodologies used in this thesis

The research aimed to examine my impression gained from reading selected print media that in spite of exciting advances in the natural sciences in South Africa and the rest of the world, progress in this area is not adequately covered in the regional print media. Mediocre coverage of science has been posited as a contributing factor to the lack of interest in the sciences among young people and to the marginalisation of natural sciences within popular discourse (DST 2012: 36; van Rooyen, 2002: 2-9; Claassen 2011: 352). The design of a study is dependent on the research question and the type of data desired. I chose the East London based *Daily Dispatch* newspaper as a case study to explore theoretical issues discussed in Chapters Two and Three. As a case study it would also serve to investigate how science content is treated in a regional publication. The research question for this study is: How do editors' attitudes and their perceptions of readers' interests combine with other factors to influence the publication of articles on the natural sciences in the *Daily Dispatch*? In order to produce a reasonably complete response to this question, it was deemed necessary to consider a number of sub-questions to guide the research to a meaningful conclusion:

- How much science is currently being covered in the *Daily Dispatch*, or to make it easier to quantify, how many science articles did the newspaper publish over the research period?
- What fields of science, or which categories of the natural sciences, were covered over the research period? In answering this question, due consideration had to be taken of what type of science stories were being broken nationally or internationally over the same period. This comparison was important to determine whether a category was extensively covered because there happened to be many developments in this category at the time of the survey, or conversely, a category might be devoid of content because very little of scientific interest happened in that period.
- How do senior editorial staff members feel about science reporting? This investigation probed individual positions on the role of the newspaper in covering the sciences and asked whether they had a personal interest in science reporting.
- How do senior editorial staff members understand readership interest in the natural sciences? In the absence of any market research, do they believe that readers value science reporting and should the newspaper attempt to broaden its coverage of the sciences?
- To what extent did the volume and type of science stories actually published correspond with the objectives of the newsroom?

I decided that the most effective way of answering the research question and its sub-questions was to implement a triangulated, four-stage research design. It was aimed at examining a broad spectrum of information relevant to the understanding of how a regional newspaper gauges the importance of new developments in the natural sciences. This approach envisaged a quantitative content analysis of the *Daily Dispatch's* content over the first six months of 2014, followed up with a series of semi-structured interviews with senior editorial staff and a qualitative examination of selected articles. Reasons for selecting this specific research period are made clear later in this study.

In their discussion of quantitative content analysis as a method of data collection, Deacon *et al.* (2007: 122-123) write that research objectives should determine what is counted. As the goal of the study was to ascertain the relative importance accorded to the natural sciences in the newspaper, the frequency, size and positioning of content in the *Daily Dispatch* were key

considerations. Content analysis is a useful method that enables researchers to analyse large amounts of data. The benchmark definition of content analysis comes from Berelson who writes: "Content analysis is a research technique for the objective, systematic, and quantitative description of the manifest content of communication" (1952: 18 cited in Hansen *et al.* 1998: 94). His inclusion of objectivity as a key characteristic for content analysis has frequently been criticised in recent decades so that this element is usually left out of current definitions, and while many researchers in the 21st century appear to favour qualitative methodologies, the capacity of content analysis to generate quantifiable data means that it is still a widely used method of analysis. Hansen *et al.* note that content analysis adds value to research with "a methodological rigour, prescriptions for use, and systematicity rarely found in many of the more qualitative approaches" (1998: 91). In addition, they point out that content analysis can be useful when it helps provide an indication of "relative prominences and absences of key characteristics in media texts" (1998: 95), but caution that the conclusions drawn from such indications are largely dependent on the context in which the texts are published and analysed.

Content analysis is a quantitative methodology that counts selected units of the media under consideration but says little to assist the researcher in terms of extracting a deeper understanding of the content. In other words it is useful for analysing the breadth or volume of content, but it is less helpful for drawing more profound conclusions. Hansen *et al.* succinctly capture academic reservations about content analysis noting that it "... has repeatedly been criticised, inter alia, for its quantitative nature, for its fragmentation of textual wholes, for its positivist notion of objectivity, for its lack of a theory of meaning…" (1998: 91). Further reservations about this methodology are expressed by Deacon *et al.* who note that content analysis has a potentially serious flaw as it is a directive method only answering questions posed by the researcher. This means that if the researcher asks poorly focussed or irrelevant questions, the method will "... not offer much opportunity to explore texts in order to develop ideas and insights", because content analysis can only support, qualify or refute initial questions – which may or may not be pertinent (2007: 119).

In an effort to complement the content analysis, the second phase of my research design took the form of in-depth interviews with the deputy-editor, and other senior editorial staff of the *Daily Dispatch*. There are several styles of interview that can be used to find information on a particular topic. Deacon *et al.* (2007: 65-80) note that interviews can be characterised by their

format so that a self-completion questionnaire is very different from an online semi-structured interview in a free format which is in turn quite distinct from a face-to-face interview. I followed a semi-structured, face-to-face interview format with the aim of building a cooperative rapport with the respondents. The semi-structured interview is a method within qualitative research and therefore maintains a relative openness to the unexpected. The goal of the follow up interviews (see interview guide in Appendix B) was less focussed than the quantitative content analysis because many of the questions were open ended allowing the interview to move in a direction not foreseen by the researcher. As Bryman explains: "Qualitative research is deemed to be much more fluid and flexible than quantitative research in that it emphasizes discovering novel or unanticipated findings and the possibility of altering research plans in response to such serendipitous occurrences" (1984: 78). The limited control exercised by the researcher can open new pathways to unexpected insights and add value to the research project but also runs the risk of allowing it to wander off in a direction not relevant to the research question.

The third phase of my research took the form of a qualitative content analysis of selected science articles published in the *Daily Dispatch*. The purpose of the analysis was to understand how science content is treated in the newspaper. Eight articles were chosen for analysis – one was a preview of science developments for the year 2014 and the remaining seven were about red tides that washed along the Eastern Cape shores.

In the three research phases outlined above I used a combination of qualitative and quantitative content analysis together with a qualitative analysis of open ended interviews. The expectation was that the different research methods would complement each other as part of a triangulation strategy in the fourth and final stage. Deacon *et al.* write that "when quantitative and qualitative approaches are used methodologically in combination with each other, the resulting analysis is invariably stronger" (2007: 140). They argue in favour of mixing methods judiciously in the interests of "analytical enrichment and the triangulation of research findings" (2007: 140).

4.2 Methods of data collection

The first step of the research project was to arrive at a provisional research question that would guide my study through the most appropriate methodology and theoretical framework.

The research focussed on the 'natural sciences' even though a definition of the term was problematic and made the categorising some articles quite challenging. For the purposes of this paper I used the *Collins English Dictionary* definition of natural sciences which refers to "the sciences collectively that are involved in the study of the physical world and its phenomena, including biology, physics, chemistry, and geology, but excluding social sciences, abstract or theoretical sciences, such as mathematics, and applied sciences" (Harper Collins Publishers 1986). This means that the research project excluded the social sciences. It included health sciences insofar as the subject matter encompassed scientific innovation and new discoveries, but excluded the sociological aspects of health; it included scientific discoveries and research in the environmental sciences but not socio-political developments in the field of ecology and it excluded virtually all information technology breakthroughs unless the news focussed specifically on scientific advances. Once the subject matter had been resolved, I had to take a decision about what type of journalistic medium should be examined and subsequently which individual publication or broadcast station should be selected. These decisions had to be linked to the desired outcomes of the research and had to take into account the practical considerations of doing research. In the case of my particular project, I was interested in finding out how and why a regional publication in South Africa covered the natural sciences. The *Daily Dispatch* appeared to be a suitable research target because it is a highly regarded daily newspaper that is distributed through large parts of the Eastern Cape Province, including Grahamstown. I was initially concerned that the coverage of the natural sciences in the *Daily Dispatch* might be too sparse to arrive at any meaningful conclusions. Preliminary research conducted in 2013 indicated that while the science coverage in the *Daily Dispatch* could never be described as extensive, there appeared to be sufficient to warrant further research.

The *Daily Dispatch* newspaper was confirmed as the subject of this study as it is widely sold in a province where high school pupils have done poorly in mathematics and the sciences in recent years according to the Eastern Cape Department of Education Learner Performance Report for NSC 2013 Examinations (2014: 15 – 17). Serving the East London metropolitan area and large parts of rural Eastern Cape, the *Daily Dispatch*, had an audited daily circulation of 30 199 and a readership of 233 000 in the first quarter of 2014 according to the Audit Bureau of Circulations of South Africa, making it the biggest selling daily newspaper in the province. The *Daily Dispatch's* advertising agency, Times Media Ad Room, says that

70% of its readership is in the 7 to 10 LSM[5] group meaning that its readers are in the higher income brackets. Although the *Daily Dispatch* is a relatively small newspaper, it is part of a large media company, the Times Media Group (TMG) that, according to its own financial statements, has a share capital of R1 724 million, and made a profit of R100 million in the six months ending 31 December 2014 (TMG 2015). This means that the *Daily Dispatch* can draw on far more substantial resources than the modest size of the newspaper might suggest. These resources include the Group's company-wide wire service giving the newspaper access to content produced by other publications in the company (Horner interview 16/07/2014).

As the research question has a quantifiable component, it was a logical step to count the number of articles written about the natural sciences. This means that once the research question was formulated, the next phase of the research project was to develop a sampling strategy that would determine how many and which editions of the newspaper should be included in the study. In order to reach a meaningful conclusion about the frequency of science articles in the newspaper it was necessary to delimit a research period. The sampling size, or number of editions examined, and the period of research are important because if the number of editions is too small the research will not be able to draw generally applicable conclusions. It is also important to select a research period that would reasonably reflect typical news coverage of the newspaper. For example, if the content analysis were to record a large number of articles about astronomy, we could erroneously conclude that the *Daily Dispatch* favours astronomy over all other sciences if we ignored a large astronomy conference that had been taking place during the research period, thus skewing the research results towards that topic. On the other hand, if the sample is too large, it can become unwieldy to process and difficult to interpret large volumes of data. The selected period of six months was a considered compromise between making the period as long as possible, assuming that the more data collected, the more accurate it was likely to be, and making it manageable within the scope of this thesis.

The *Daily Dispatch* is published from Monday to Friday together with a weekend edition known as the *Saturday Dispatch*, so that six editions are published every week. I included all editions of the newspaper published from the beginning of January 2014 until the last day of

[5]The South African Audience Research Foundation LSM (Living Standards Measure) is the most widely used marketing research tool in Southern Africa. It divides the population into 10 LSM groups, 10 (highest) to 1 (lowest).

June of the same year, resulting in a total of 150 editions for the purposes of this study. As I wanted the research period to be representative of the typical science coverage of the newspaper it would have been ideal to select a period when nothing extra-ordinary was planned. The research period selected did however, include the time during which the annual science festival, Scifest Africa, is held in Grahamstown, a town located within the normal coverage area of the *Daily Dispatch*. It was presumed that the festival would result in a statistical spike in the number of science articles published in the newspaper.

4.3 Drawing up a coding schedule

The content analysis was based on a coding schedule designed to assess each natural science article published in the newspaper. The coding schedule is a pivotal element of the research project designed to extract the desired data in a format that can be interrogated to generate meaningful conclusions. Before I began the content analysis I had imagined that most science related articles in my research would be about astronomy and palaeontology. Astronomy was expected to feature prominently because South Africa had recently been chosen to host the greater part of the Square Kilometre Array (SKA) radio telescope - one of the biggest science projects in the world. Furthermore, two universities in the Eastern Cape – Rhodes University and the Nelson Mandela Metro University – are both heavily committed to research and the construction of the SKA project. I also believed that my research would record several articles of paleontological interest as new discoveries in this field are frequently made in the Cradle of Mankind in the Gauteng Province and in the Karoo regions of the Eastern Cape. These finds are important because they can influence polemical theories regarding our understanding of evolution. In presenting the data in the next chapter it becomes clear that my predictions were misplaced and that neither astronomy nor palaeontology featured prominently in the content analysis.

A quantitative content analysis is demanding because although researchers strive to establish value-free, objective coding schedules, Deacon *et al.* (2007: 132) argue that the research process invariably depends on arbitrary decisions. These decisions include: what you count, how much you sample, and how you categorise the content. Deacon *et al.* write that these decisions "are ultimately produced by the researcher's subjective judgement of what is significant" (2007: 132). This study counted and categorised only articles containing references or explanations about the natural sciences covering a broad range of fields

including astronomy, biology, physics, chemistry, and geology. It was not required that scientific elements be central to the article, it was only necessary that there be some form of scientific reference or explanation. This research excluded articles where the business of science and technology companies was the subject matter of the coverage, but did include budgetary allocations to research and development. The reasoning behind this distinction is that if a technology company such as Google or Microsoft announced a new marketing strategy or their latest financial results, such an announcement would have no direct bearing on scientific or technological research. However, when the Minister of Science and Technology presented her budget to Parliament it would have far reaching consequences for the scientific community. These classification criteria can be construed as arbitrary and complex to apply, but they were indispensable as some form of delimitation is required for practical considerations of manageability. The decision to narrow the focus of the study to the natural sciences and thus exclude the social sciences made it possible to explore the content produced to greater depth.

A coding manual (see appendix C) to guide the process of placing articles in specific categories presented a challenge as some articles bridged two or more categories and two articles on the same subject could have different emphasis. To find out what type of science content is being published in the *Daily Dispatch*, articles were classified according to their subject matter into four broad categories: Health, Environment, Fauna and Other Topics, which were in turn sub-divided into 26 sub-categories. The health and environment categories were practically self-selected as it was clear from a preliminary organising process that they would be quickly populated. It has furthermore been established that health and environmental sciences are usually better covered than other sciences in South African media (Claassen 2011: 363). The Fauna category was chosen as a pragmatic catch-all to accommodate science articles about zoology, ichthyology and entomology. Other Topics was a necessary category as the range of other sciences covered was thinly spread over many different fields. The classification of sub-categories was difficult, and to some degree arbitrary, for example, the creation of a special category for Red Tide was based on the fact that it featured prominently in the reporting of local science. The series could just as easily have been categorised as a health or environmental story, and some of the Red Tide articles would plausibly fit into the Behaviour/lifestyle category.

As the aim of my research was to ascertain the relative weight accorded to the natural sciences, it was appropriate to take into consideration the size and positioning of articles in the newspaper. Clearly a large front page article about a new discovery in the sciences would confer greater prominence than a small item buried at the bottom of page 17. Similarly a feature with a large photograph or graphic could mean that the editor believes the article is of greater consequence than a filler piece without any visual elements. As each article was coded, separate fields recorded the word count, the page number and the article position on the page.

The original source of editorial content can be a significant indicator in assessing how important the subject matter is within the context of a particular publication. As editors have limited resources available for the production of a newspaper, deciding what resources to allocate to a story is a key decision. If the editor decides that the story is of great consequence it would be worthwhile to assign a writer, a photographer and maybe even a graphic designer to produce an illustrated feature item. On the other hand, it would simply be easier and more cost effective to pull a pre-packaged item off the Times Media Group wire service or one off the international wire services such as Reuters or AFP. There are several reasons why an editor might follow the more expensive and time consuming route of assigning a staff reporter to a story rather than using readily available wire service copy. It is possible that for a particular local story, the agencies had not covered the story at all, or perhaps had not given it due weight. It could also be that the editor wishes to highlight the local angle of a larger national story. This last scenario was applicable in a series of articles about red tides published in the *Daily Dispatch* during the research period. The red tides had affected large parts of the Western Cape and the Eastern Cape, but the editor chose to narrow the focus of the series to how they affected the coastline from Port Alfred to East London – an area well within the distribution range of the newspaper.

In coding for the sources of science articles published in the newspaper, I was able to separate out data revealing whether the articles were written by staff members of the *Daily Dispatch* or whether they were sourced externally. Those from outside the newspaper could be further categorised as coming from other Times Media Group publications, foreign wire services or a British newspaper. It was of interest to find out how much the newspaper valued overseas science stories considering that discoveries in the sciences should be internationally valid and would not only be of local interest.

4.4 Editorial leaders share their views on science journalism

Following the content analysis, the next stage of the study consisted of semi-structured interviews with the deputy editor and other senior newsroom staff members of the *Daily Dispatch*. Five interviews with senior editorial staff were conducted in the offices of the *Daily Dispatch* in East London and the interview with senior reporter, David Macgregor who is based in Port Alfred, was recorded in Grahamstown. Each interviewee was informed about the purpose of the interview and was told that the content of the discussion was not destined for publication in the general media. All interviews were recorded with the permission of the interviewees and subsequently transcribed[6]. The semi-structured interview format provided the respondent with ample opportunity to elaborate on his or her answers or even challenge the direction of the questioning and thus potentially provide a richer understanding of the topic. In preparation for the interviews, I compiled an interview guide (see Appendix B) listing the themes to be dealt with to ensure that the main topics of my research interest were covered.

Questions were structured to gain insight into the attitudes and news values of the newsroom and other factors that might determine whether to cover a science story or not. As the research question of this study seeks to understand what informs the editorial decision making process to include or exclude science stories, respondents were asked whether there were any formal or even informal policies on covering science stories. Staff members were also asked whether they were personally interested in the natural sciences and how they felt about writing articles on the sciences. This was followed up with discussions designed to ascertain whether the editorial team believed their readership shared any interest in the sciences. The questions linked to readership preferences were explored extensively as the values and interests of readers usually determine what is published, but the newspaper had not done any market research on readers' attitudes toward science content and relied heavily on the intuition and perceptions of staff members in this regard.

Editorial staff were asked about the quantity and importance of science articles as well editorial processes involved in assigning science stories to reporters. An examination of these

[6] Audio material and transcription texts are available on request.

systems was relevant to determine whether the newsroom was driven hierarchically, in a top-down manner so that all story ideas were generated by the editor and his deputy or alternatively, did the chain of command allow for the generation of editorial content from all levels within the newsroom?

4.5 Qualitative content analysis of selected articles

Comparing the aims and expectations of the editorial staff with a six month content analysis measuring the newsroom output allowed for a better understanding of how editorial policies and processes combined to generate articles that appear on the pages of the newspaper. The research was however, still blind to the qualitative characteristics of these articles. Therefore, to gain a more nuanced insight into their content and structure, I undertook a qualitative content analysis of eight articles. They were purposefully selected to throw light on specific characteristics of the newspaper's treatment of matters of scientific interest. The first article was a fairly lengthy preview of which science stories were likely to make the news in the coming year. It was important because it set the tone for science coverage and implicitly promised readers that the newspaper reporters would be watching out for these stories and would presumably cover them when they materialised. The remaining seven articles dealt with red tides that affected the Eastern Cape coastline along the *Daily Dispatch*'s coverage areas. The red tide series was selected because it was about a phenomenon that directly affected the newspaper's target audience and thus met the most important prerequisite for science coverage according to the deputy editor, Brett Horner. He was adamant that in order for a science story to be covered it had to be locally relevant (interview 16/07/2014). The red tide series provided additional interest as it was spread over a two month period from the end of January to the middle of March. It was therefore informative to establish how coverage of the phenomenon evolved over a longer period than most newspaper stories.

The examination considered qualitative aspects of the articles that cannot easily be counted or measured. As local relevance is a key consideration for the newspaper, the qualitative study could determine whether the articles about the red tides considered the perspectives of readers such as fishermen, seafood consumers or residents engaged in beach activities. The qualitative study was also able to examine which angles of the story are highlighted; the depth and general accessibility of the science; who is quoted; what positions are taken, if any; and which models of science journalism are applicable. The information gathered from the

qualitative study of the eight articles provided insight into the correlation between the stated aims of the senior editorial staff and the actual content published. As the research question of this thesis focuses on the attitude of the editors, it was deemed productive to understand how their editorial attitudes affected the science content in the *Daily Dispatch.*

4.6 Triangulation strategy used to achieve multiple perspectives of science coverage

One of the principal goals of this study was to find out whether there was a correlation between editorial objectives with respect to the natural sciences and the science content actually published by the *Daily Dispatch.* Editorial staff interviews and descriptive analyses of articles were used in a triangulation strategy designed to achieve this goal and to resolve potential anomalies recorded in the content analysis. The content analysis is a quantitative methodology used to count units of analysis while the staff interviews and the descriptive analyses of selected articles follow fundamentally qualitative methodologies. Deacon *et al.* note that in contemporary media studies there is a "continuing bias against quantification" (2007: 140). They lament this bias "for when quantitative and qualitative approaches are used methodologically in combination with each other, the resulting analysis is invariably stronger" (Deacon *et al.* 2007: 140). Spicer adds that triangulation can be used "to crosscheck results for consistency and to offset any bias of a single research method" (2004: 297). I employed both methodologies so that my analysis would be stronger enabling me to check the results for consistency.

4.7 Limitations to the study

As this research was a case study investigating the practices of only one regional newspaper it cannot be said to represent the strategies of other regional newspapers in the country, nor can it claim to represent similar newspapers in the Times Media Group stable as each publication has its own editorial direction. However, as qualitative case study methodology allows researchers to study complex phenomena within their contexts, it opens the way for the researcher to speak to theory rather than necessarily generalise to other cases or populations. In this case, the research will provide valuable insights into the importance of the attitude and perceptions of senior editorial staff in shaping the coverage of the sciences in a newspaper.

There are also limitations inherent in the sample size and research period. While 150 editions of the paper over a six-month period is a fairly extensive representation of the *Daily Dispatch's* output, we cannot say for certain that the first six months of 2014 was a typical sample of the newspaper's production. An additional limitation was the absence of an observational component in this research. Due to time constraints there were no opportunities to monitor interactions between editorial staff, who commission stories, and reporters who are sent out on assignments. It might have been instructive to observe whether the diary meetings were as open to outside ideas as the deputy editor had intimated (interview 16 July 2014), or were they run on a semi-authoritarian basis.

The results of the research are presented in the following chapters of this thesis.

Chapter Five: Data Presentation and editorial perspectives

5.0 Introduction

This chapter presents the results of the quantitative content analysis of all editions of the *Daily Dispatch* published in the first half of 2014. The analysis was designed to ascertain the quantity, sources and nature of the science content carried in the newspaper. Chapter Five also presents conclusions drawn from interviewing six members of the editorial leadership about their views on the place of science articles in their newspaper and how their opinions influence the publication of science articles.

5.1 Number of science articles published each month

Research for this thesis began with a quantitative content analysis aimed at finding out how much science content is published in the *Daily Dispatch*. In the first six months of 2014, the *Daily Dispatch* published 150 editions -- five on week-days and one on Saturdays. Although the *Saturday Dispatch* has its own identity, in this thesis it is included as part of the *Daily Dispatch* since it is produced in the same newsroom and almost all editorial staff work on both editions.

In the research period, the *Daily Dispatch* published 128 articles that included at least a token amount of scientific research. The number of science articles published each month is shown in Table 1 below. The total figure of 128 for the research period translates into an average of just over 21 science articles per month, and the month with the highest recorded number of science articles was March with 29. This spike can be partly attributed to the higher number of contributions (21) from the *Daily Dispatch's* own staff members who wrote a series of articles on the red tide phenomenon[7] that affected the Eastern Cape coastline and a second series on the annual Scifest Africa festival held in Grahamstown.

Table 1 - Science articles published in the *Daily Dispatch*

No. of	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Total**
Editions	25	24	26	25	26	24	**150**
Science Articles	25	16	29	25	16	17	**128**

[7] The articles are examined in some detail in Chapter 6 of this thesis. The full texts of the articles are available in Appendix A.

Table 1 shows that there was an average of 0.85 science articles per edition during the research period. An assessment of whether this number of articles is good bad or indifferent, requires some kind of benchmark for comparisons. A Stellenbosch University study conducted in 2002 noted that while the South African press has often been criticised for its lack of science and technology coverage, no research has either supported nor rejected such accusations (Van Rooyen 2002: 3).The study of 15 publications over a three month period found that "only 1,8%" of the editorial content was dedicated to science and technology (Van Rooyen 2002: 13).The use of the adjective "only" combined with the concluding remarks that "[t]he small percentage of science and technology articles published during the research period points to a lack of science and technology coverage in the South African press" (Van Rooyen 2002: 20), indicate that in the opinion of the lead author, 1.8% is not enough. The study fails, however, to suggest what an appropriate percentage would be. The Stellenbosch University study counted the number of articles but did not consider their word-counts nor their prominence.

The paucity of local or foreign quantitative research aimed at establishing a benchmark or desirable level of science journalism undermines attempts in this thesis to say whether the *Daily Dispatch* is doing enough – or not. There is in South Africa however, a broad if informal consensus among academics (Claassen 2011: 351-352; van Rooyen 2002: 20), the South African National Editors' Forum (SANEF 2011) and government (Department of Science and Technology 2012: 43) that the local media is faring poorly in its coverage of science and technology.

5.2 Who are the main contributors of science content in the *Daily Dispatch*?

Daily Dispatch deputy editor, Brett Horner makes extensive use of internet news and social media sites in his daily search for story ideas. He says, "I have a bunch of websites that I go to and obviously I use my Twitter account to aggregate news" (interview 16/07/2014). He scans his Twitter account which serves as a type of news feed to replace the diaries that used to be published by the now defunct South African Press Association (SAPA[8]) wire service. The *Daily Dispatch* receives a group diary from the parent company Times Media Group so that all members of the group can "feed off each other's copy" (Horner interview 16/07/2014). The newspaper also has rights to take copy off two international wire services – Reuters and AFP – as well as the United Kingdom based newspaper, *The Daily Telegraph*.

[8]Sapa was a non-profit news content co-operative operating between July 1938 and March 2015.

Table 2 shows how many science articles were drawn from the various sources available to the *Daily Dispatch* during the research period.

Table 2 - 2014	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Total**
SOURCE							
Daily Telegraph, UK	2	4	3	3	6	5	**23**
Daily Dispatch							
David Macgregor	2	0	6	1	2	3	**14**
Vuvu Vena	0	2	5	5	0	2	**14**
Mike Loewe	3	0	2	0	0	0	**5**
Other *Daily Dispatch*	1	1	8	6	0	1	**17**
Total *Daily Dispatch*	6	3	21	12	2	6	**50**
Times Media							
Tamar Kahn	2	2	1	1	1	3	**10**
Other BDLive	2	0	1	0	0	1	**4**
Other Times Media	7	2	0	0	2	1	**12**
Total Times Media	11	4	2	1	3	5	**26**
Wire Services							
Reuters	4	1	4	3	2	1	**15**
AFP	1	2	1	6	2	1	**13**
Total Wire Services	5	3	5	9	4	2	**28**
Others	1	2	0	0	1	0	**4**
Total	**25**	**16**	**31**	**25**	**16**	**18**	**131***

*There are more sources (131) than articles counted (128) because three articles had by-lines for two reporters.

Data in Table 2 show that the *Daily Dispatch's* own reporters, with a combined 50 articles, were collectively the biggest group of contributors to the newspaper's science coverage. This might appear to be counter-intuitive because none of the three reporters interviewed appeared to be particularly motivated to cover the natural sciences. It should be noted however, that science or scientific explanations were not central to any of the fifty articles referred to above. To a greater or lesser degree, scientific explanation provided contextual information rather than the main thrust of the article. Examples of this supporting role played by scientific explanation can be found in the eleven 'healthy eating' articles recorded in the content

analysis which essentially offered advice on what people should, or shouldn't be consuming, and then provided a brief scientific explanation to support the advice.

The Times Media Group provided a total of 26 science articles to the *Daily Dispatch* during the research period. Tamar Kahn, the most prolific science writer for *Business Day Live*, wrote ten articles used in the *Daily Dispatch* and was the largest contributor from the Times Media Group. Combining the 50 articles written by the *Dispatch* reporters with the 26 contributed by other publications in the Times Media Group (TMG), the group as a whole produced a total of 76 articles. This means that 59% of the science articles published by the *Daily Dispatch* were generated in South Africa by TMG reporters. Articles sourced from overseas came from Reuters (15) and AFP (12) wire services as well as *The Daily Telegraph* (23). The proportion of local (59%) to foreign sourced science articles (41%) is remarkably similar to the results of the Stellenbosch University study. According to the author of that survey:

> A great number of articles were obtained from foreign publications, like the *Daily Mail*, and wire services like Reuters, Sapa and Associated Press. According to the data, 38% of the science and technology coverage in this particular sample of the South African press can be attributed to foreign sources or non-editorial authors. (Van Rooyen 2002: 13)

5.3 Science articles published in the *Daily Dispatch* by category

Articles were classified according to their subject matter into four broad categories: Health, Environmental, Fauna and Other Topics, and 26 sub-categories. Some stories were counted in multiple categories resulting in a total of 154 categorisations in Table 3 recording the number of articles per category, while the actual number of articles shown in Table 1 is only 128.

Table 3	**Number of articles per category**							**%**
Subject matter	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Total**	
Health								
Other health	2	1	2	6	3	1	**15**	**9.7%**
Behaviour/lifestyle	0	1	2	4	4	1	**12**	**7.8**
Healthy eating	2	1	3	1	2	2	**11**	**7.1**
Stem cell/Genetics	2	2	0	3	0	2	**9**	**5.8**

Oncology	0	2	0	0	2	2	**6**	**3.9**
General health	1	2	2	1	0	0	**6**	**3.9**
Fertility/reproduction	1	1	2	0	1	0	**5**	**3.2**
Eye care	0	0	1	1	0	2	**4**	**2.6**
Ebola	0	0	2	2	0	0	**4**	**2.6**
Medical technology	0	1	0	0	0	1	**2**	**1.3**
Health Total	**8**	**11**	**14**	**18**	**12**	**11**	**74**	**48.1**
Environmental issues								**%**
Red tide	3	0	4	0	0	0	**7**	**4.5**
Climate change	2	0	2	1	1	1	**7**	**4.5**
Environment general	1	0	2	0	1	2	**6**	**3.9**
Green energy	2	0	0	0	0	0	**2**	**1.3**
Environmental Total	**8**	**0**	**8**	**1**	**2**	**3**	**22**	**14.3**
Fauna								**%**
Ichthyology	0	0	2	4	1	0	**7**	**4.5**
Zoology	0	2	0	1	1	1	**5**	**3.2**
Entomology	1	0	0	0	0	1	**2**	**1.3**
Fauna Total	**1**	**2**	**2**	**5**	**2**	**2**	**14**	**9.1**
Other topics								**%**
Space/astronomy	5	0	2	1	1	2	**11**	**7.1**
Forensics/crime	0	2	1	4	1	1	**9**	**5.8**
Information technology	6	2	0	0	0	0	**8**	**5.2**
Scifest	0	0	4	0	0	0	**4**	**2.6**
Faux science	0	1	0	1	1	0	**3**	**1.9**
Other Science	1	0	1	1	0	0	**3**	**1.9**
Palaeontology	1	0	0	0	0	1	**2**	**1.3**
Government funding	1	1	0	0	0	0	**2**	**1.3**
Earthquakes	0	1	0	1	0	0	**2**	**1.3**
Other Topics Total	**14**	**7**	**8**	**8**	**3**	**4**	**44**	**28.6**

Table 3 above shows that the Health category, with just over 48% of the articles, has by far the greatest representation. This is not surprising as the health reporter at the *Daily Dispatch*

is the only staff member who would routinely report on some aspect of the sciences. Health reporter, Vuvu Vena, and senior reporter David Macgregor, with 14 stories each, wrote the most science articles published during the research period. However, 13 of Vena's 14 articles were about health issues while Macgregor's articles fell into the Environmental or Other Science categories. This imbalance is not at all unusual as health related articles tend to dominate all surveys aimed at identifying the most popular science stories in mainstream media (van Rooyen 2002: 07; Russell 2006: 08; Bauer *et al.* 1994: 05). Elmer *et al.* put it succinctly: "Altogether, medicine/health and biology dominate science coverage worldwide" (2008: 880). The dominant sub-categories in the *Daily Dispatch* survey are Behaviour/lifestyle and Healthy eating – and since the second sub-category could easily be subsumed into the first, it indicated that almost 15% of the science articles recorded in the six-month research period could fit in the Behaviour/lifestyle sub-category. The predominance of these and other health sub-categories demonstrate that Horner's editorial position (interview 16/07/2014) on preferring articles that are directly relevant to readers, is consistent with what the newspaper actually published.

5.4 How prominent are science articles in the *Daily Dispatch*?

Factors that can contribute to the prominence of articles in a newspaper are the page number, section, position on the page, size of the article and accompanying photographs or graphics (Holmqvist and Wartenberg 2005: 1-2).

5.4.1 Page number or section

Intuitively, page one is the most visible and coveted page of any newspaper as it is the only one displayed on newsstands. As a rule of the thumb, the prominence and desirability of pages diminishes as their numbers increase. This rule does not hold in all cases as it is sometimes preferable to be in a certain section where readers look for specific content. For example, a company might prefer to see its profile in the Business Section even if it is only page twenty, rather than page three. It is also widely accepted that spaces on the right side of a spread have greater prominence than the left side (Kress and Van Leeuwen (1996) cited in Holsanova *et al.* 2006**:** 71) thus making page three more sought after than page two.

There were no science articles on the front pages of the *Daily Dispatch* throughout January and February 2014, but on 6 March, a science story under the headline "Red tide invades EL[9]

[9] EL is an abbreviation for East London where the *Daily Dispatch* is published

beaches" was the lead story on page one. On 24 March another science story made it to the front page with the headline: "Tourist dies in 8th PSJ[10] shark attack". The science in this article was tenuous and included only because it considered possible reasons for the attack. A few days later, on 27 March, two science related articles dominated the front page of the *Daily Dispatch* – but in neither case was science the main focus of the article. The first one under the headline: "'Organised' thieves steal museum's space rocks" was a story referred to earlier in this chapter about the theft of meteorites from the East London Museum. The second article, under the headline "Action after PSJ's deadly shark attack" was a follow-up to the shark-attack piece published on 24 March. There were no science articles on the front page in April, but on 13 May, the lead story on page one was an article headlined "Rhodes fires copycat pair". It dealt with two Rhodes University academics fired for falsifying and fabricating research findings submitted to scientific journals. This article had no science in it other than the fact that the two individuals had allegedly falsified results about scientific experiments. There were no further science related articles on the front pages of the *Daily Dispatch* during the research period.

While science content on the front page of the *Daily Dispatch* is somewhat rare, topics of scientific interest appear more frequently on minor news pages. Horner explained how the newspaper places science stories carried on international wire services:

> … because it often comes out of the world wire, it goes to the world page. Or the other space is the Daily Life which I sometimes try to push. If there is that kind of sciency stuff, I'll push it onto Daily Life which is our features page, because science is life. On Wednesday we've got Dispatch Voice which is our ordinary feature page. (interview 16/07/2014)

5.4.2 How big is the article?

Word count can be an important factor contributing to the prominence of an article. A large, one thousand-word article is naturally more visible than a small 90-word filler. Most articles in the *Daily Dispatch* appear to have between 300 and 600 words and 62.5% of science articles fall within the same 300 to 600-word band. Some articles appear to be cut and placed in awkward places simply to fill space in the layout of the page – these articles are known as

[10] PSJ is an abbreviation for Port St John, a coastal town that has recorded several deaths as a result of shark attacks.

'fillers'. Several science articles from wire services and sister TMG newspapers were used as fillers in the research period.

Table 4 – Word counts	Jan	Feb	Mar	Apr	May	Jun	Total
Below 100	3	0	0	1	1	0	5
100 - 200	4	2	0	1	1	1	9
200 - 300	6	3	3	2	0	3	17
300 - 400	1	2	7	10	4	7	31
400 - 500	4	4	4	5	5	3	25
500 - 600	5	2	8	3	3	3	24
Above 600	2	3	7	3	2	0	17
Total	25	16	29	25	16	17	128

The above table shows that 14 articles (11%) were less than 200 words long, probably indicating that they were used as fillers. The table also shows that a fairly significant number of science articles (41) were longer than 500 words and would almost certainly be described as feature items rather than news stories.

5.4.3 Accompanying photographs or graphics

Eye-catching photographs and/or graphics draw readers to an article. In the content analysis for this study, the number of photographs and graphics linked to science content were counted with the purpose of identifying efforts aimed at making the science articles more visible. Table 5 below shows the number of science related photographs and graphics published during the research period. Some articles carried more than one photograph or graphic. The data suggests that a high proportion of science related articles are made more prominent with the addition of either photographs or graphics

Table 5	Jan	Feb	Mar	Apr	May	Jun	Total
Photographs	10	9	23	13	9	9	73
Graphics	2	0	2	3	1	0	8
Total	**12**	**9**	**25**	**16**	**10**	**9**	**81**

The fairly substantial number of photographs and graphics that accompanied science articles would suggest that while many science articles are interesting and are therefore accompanied

by photographs or graphics, they are not newsworthy enough for the most important news pages.

5.5 How the hierarchy of influences shapes science journalism at the *Daily Dispatch*

The quantitative content analysis presented in the sections above investigated the following questions: How often are science articles published in the *Daily Dispatch*? Where are the science articles sourced from? What type of science is covered in the newspaper? And how prominent are these articles? The remainder of this chapter is dedicated to applying the Hierarchy of Influences Model discussed in chapter three of this thesis to understand the influences that shape the publication of science content in the newspaper. The Model proposed by Reese and Shoemaker (1996: 63-251) considers five levels of analysis examining influences from the micro level of the individual reporter to professional routines of individual reporters, the media organisation, extra-media institutional forces and finally to the macro level of socio-cultural ideology (Reese 2007: 34-38). The five levels can be considered in either direction, from the micro to the macro level or vice versa. Reese argues (2007: 37) that this is a matter of analytical emphasis and preference, but that "[I]ntuitively for many, the actions of individuals are closest at hand, most easily visualized and observed" (2007: 37). The analysis below, based on interviews with senior editorial staff members, will follow Reese's preferred direction.

5.5.1 Influences of individual reporters

Interviews with six senior editorial staff members of the *Daily Dispatch* were conducted to gain inside perspectives or an emic view of the editorial thinking of the newspaper. The interviews were deliberately structured to answer the research question of this study: 'How do editors' attitudes and their perceptions of readers' interests combine with other factors to influence the publication of articles on the natural sciences in the *Daily Dispatch*?' The findings from the interviews are presented below following the five levels of analysis in the Hierarchy of Influences developed by Reese and Shoemaker (1996: 63-251).

The editorial staff members interviewed were:

1. Deputy editor, Brett Horner
2. Chief sub-editor, Alison Stent
3. Managing editor, Cheri-Ann James
4. Chief reporter, Mike Loewe

5. Senior court reporter, Ray Hartle
6. Senior reporter, David Macgregor

The first level of analysis in the Hierarchy of Influences (Reese and Shoemaker 1996: 66-102) examines how the individual reporter can shape the publication of content. None of the three senior reporters interviewed (Hartle, Loewe and Macgregor) expressed an interest in proactively seeking out or writing up science articles. Horner was the only one of the six interviewees who intimated that he might make an effort to have a science story published. He said, "I do enjoy science stories, and if it is me, I will try and push it a bit more" (Horner interview 16/07/ 2014). It was however, broadly accepted among the interviewees that if a reporter had a special interest in the sciences there were opportunities to influence the coverage in the newspaper. Stent said that it "depends on the personality of the reporter" and that "… the total personality of the newsroom depends on the collection of individuals at the time". She added that if a reporter wanted to push science stories it would be possible to do so: "Just one reporter with an inclination will change the flavour of the paper" (Stent interview 16/07/2014). This last statement is an inferred acknowledgement that at the time of the interviews, science content was not a high priority at the *Daily Dispatch*, and that the personal views of the journalists were not in conflict with the editorial direction of the newspaper.

5.5.2 Journalists and their routine practices or procedures

The practice of strategic rituals elaborated by Tuchman (1972: 660-661) is incorporated as the second level of analysis in the Hierarchy of Influences Model (Reese and Shoemaker 1996: 105-137). This level of analysis enables the examination of the routines that reporters follow when approaching their daily tasks and considers how these rituals and procedures influence their thinking about the importance of reporting on the sciences.

Editorial staff members did not display any concern about the absence of a science beat or a science reporter because firstly, they did not consider science content to be a priority and secondly, they argued that the *Daily Dispatch* has senior reporters who are willing and able to write science articles when required to do so. There was consensus among the interviewees that science reporting was more complicated than other beats and that was good reason to assign science stories to more experienced members of the newsroom (interviews 16/07/2014). While none of the senior reporters felt inclined to actively seek out science stories, all three (Hartle, Loewe and Macgregor) declared that they would do the research and

write the required articles to fulfil their professional obligations. In this respect they would be carrying out the strategic routines of their jobs – whether their employment contracts specifically required it or not. Loewe said that while he was willing to do science stories when called upon to do so, it would not be his first choice as he believes there are more important issues to cover (interview 16/07/2014). Macgregor went a step further saying that it did not matter whether a reporter was interested in a topic or not as it was their professional duty to make themselves interested in science when the job required it of them (interview 12/05/2015).

5.5.3 Media organisation – the *Daily Dispatch*

In terms of the Hierarchy of Influences Model (Reese and Shoemaker 1996: 139-172) described in Chapter Three, the media organisation is the third of five levels of analysis falling between the reporters and their routines on the one side, and the outside world on the other. The influences at this level of analysis are central to this thesis as the research question concerns how editorial attitudes within the media organisation determine the publication of science content. For this reason, the organisational influences at play within the *Daily Dispatch* will be dealt with in more detail than the two previous levels.

The newsroom structure at the *Daily Dispatch* reflects the primacy of political reporting at the newspaper. The reasons why political subject matter is prioritised are explored in the section below on the socio-political context of the region. The newsroom is divided into three desks: a political desk, a metro desk and the remainder of the newsroom combined. A relatively well resourced political desk in East London with a bureau in Bhisho dedicated to covering the Eastern Cape provincial legislature supports Horner's contention that "we have always been a political newspaper" (interview 16/07/ 2014).The political desk has its own editor and deputy editor as well as a dedicated reporter. The metro desk focuses on more localised politics in East London and King Williams Town with special emphasis on the Buffalo City Metropolitan Council[11] as well as "bread and butter issues coming out of those areas" (Horner interview 16/07/2014). The third pillar of the newsroom covers general beats including general news, education, health, crime and the courts. The Sports Department appears to operate independently of the rest of the newsroom.

[11] The Buffalo City Metropolitan Council is responsible for administering East London, King William's Town and several smaller urban communities in the area.

Reporting at the *Daily Dispatch* functions through a beat system, but Horner says it is not very strictly applied. The newspaper has two education reporters, one for higher and one for basic education, a health reporter, a crime reporter, and a business reporter. He adds that although the reporters have their beat allocations, "as circumstances demand, those people may have to pick up a breaking news story that is completely outside of their beat" (interview 16/07/ 2014). The *Daily Dispatch* does not have a science reporter and although Horner says he would like to have one if the newspaper could afford it, he does not consider its absence a serious problem (interview 16/07/ 2014). Horner says that when the newspaper covers health stories, whether of scientific or sociological nature, "the health reporter would generally pick that up". If the story has an academic bent then he assigns the education reporter to cover it (interview 16/07/ 2014).

5.5.3.1 What kind of science article does the *Daily Dispatch* publish?

The senior editorial staff of the *Daily Dispatch* have a clear understanding about what type of news has precedence in the newsroom. They work at a newspaper that has a long history of fighting against social injustices from the anti-apartheid struggle under Donald Woods, editor from 1965 to 1977, to the public journalism *Community Dialogues* in 2009 under the editorship of Andrew Trench (Amner 2010: 2). The current editor, Bongani Siqoko, has followed in this tradition making his editorial priorities clear soon after he was appointed in 2013: "We encourage our journalists to use their pens to fight social injustices, defend the vulnerable and fight hard for their communities" (Siqoko 2013). In line with the newspaper's social justice agenda, the important beats in the newsroom are politics, council, health, education and schools. Science is not a priority (James interview 16/07/ 2014).

Even though the *Daily Dispatch* does not prioritise science stories, the content analysis discussed in the first section of this chapter revealed that the newspaper does publish science related articles on a fairly regular basis. A number of factors can influence editors' decisions on whether or not to publish science content including: news values of the organisation, perceptions of readers' preferences, personal interests of the reporters, reporters' ability to write science articles and availability of other sources of content such as wire services. Proposing a theory of news values for media organisations, Harcup and O'Neill (2001: 278-279) stated that a story should satisfy at least one of ten requirements for it to be published. This means that stories should have a focal point on at least one of the following news values: the power elite, celebrity, entertainment, surprise, bad news, good news, magnitude,

relevance, follow-up and newspaper agenda. The above requirements do not constitute immutable rules, but they do provide guidance on what news values would apply to prompt the editorial leadership to publish a science story.

5.5.3.2 Relevance as a news value

In considering which news values would apply for the publication of science content, the editorial leadership of the *Daily Dispatch* was confident that direct relevance to readers would normally be decisive. The news value of relevance, included in the taxonomy proposed by Harcup and O'Neill (2001: 279), is articulated at the *Daily Dispatch* as 'finding the local angle'.

The newspaper is resolute about its identity as a regional newspaper that focuses primarily on regional issues, but that also happens to have a 'World' page. Horner said that if there were any kind of scientific breakthrough reported in a foreign source, he would probably instruct a reporter "to do a local match up" (Horner interview 16/07/2014). Some foreign science stories do manage to find their way onto the 'World' page, but the most reliable way of having a science article published in the newspaper is through a local angle. Horner said that if the story is relevant to the local population, and especially if it is located in the Eastern Cape "it would probably get some kind of coverage" (Horner interview 16/07/2014). Chapter six of this thesis examines a series of articles about red tides off the Eastern Cape coast that serves as an example of science reporting that is relevant to local readers.

Horner emphasised the value of local connections pointing out that the newspaper has a good relationship with the East London Museum, but noted that any science story would probably "be treated on an event basis" rather than having a reporter actively seek out science in the newspaper's coverage area. To support his argument he said that senior reporter, David Macgregor "has done quite a bit on one of the professors who digs up all the shale rock from the N2, and we have given him some nice coverage, every time he makes a discovery, because it is a discovery, because it is local, it is our own people" (Horner interview 16/07/2014).

5.5.3.3 The entertainment factor as a news value

The news values identified by Harcup and O'Neill (2001: 278 and 279) include the entertainment factor on their list of ten values. When evaluating potential science stories for

publication in the *Daily Dispatch*, senior members of the newsroom consider the unusual or even the bizarre as valid news values. Horner remarked that when they have a science story from the East London Museum "it can find place on the front pages, because it is normally interesting, and it is normally so quirky, oddball, it belongs on the front page" (interview 16/07/2014). It was clear from his comments and the opinions expressed by other members of the editorial team that 'the peculiar' was far more likely to be published than most other forms of new scientific research. In other words, it's science as 'news' rather than science for the sake of science which seems to drive this decision-making.

5.5.4 Influences from outside institutions on the *Daily Dispatch*

The *Daily Dispatch*, like all other media establishments, does not operate in isolation as it is subject to a range of influences from outside the organisation. This level of analysis in the Hierarchy of Influences refers to sources of information such as special interest groups; public relations campaigns; other news organisations; revenue sources, such as advertisers- and audiences; other social institutions, such as business and government; the economic environment; and technology (Reese and Shoemaker 1996: 178-219). This section of the thesis will examine three external factors that have a direct bearing on the production of science content in the *Daily Dispatch*. The factors are: socio-political context, reader preferences for science content and academic institutions.

5.5.4.1 Socio-political context

The *Daily Dispatch* is edited in East London and distributed over a large part of the Eastern Cape province where many communities live in impoverished socio-economic conditions and have to cope with poor service delivery from government (Amner 2010: 10-14). Pressing matters covered during the research period included articles about areas where the refuse was not being collected; local government officials involved in tender corruption and the mayor appearing in court in connection with corruption allegations (Loewe interview 16/7/2014). The editorial leaders of the newspaper were unequivocal about their responsibility to prioritise socio-political issues before they could commit to improving its science coverage. They intuitively apply the 'relevance' news value while striving to report on how government indifference and corruption leave large segments of the population condemned to a life of poverty. Their intense focus on exposing the socio-political tribulations of the local population have caused the 'relevance' news value to become almost indistinguishable from

the newspaper's own agenda – another of the ten news values proposed by Harcup and O'Neill (2001: 278-279).

Loewe said the *Daily Dispatch* "overtly pushes a political agenda" because it is "pretty much holding the line against some horrible corruption and poor service delivery and some gaps in government which are alarming" (interview 16/07/2014).To emphasise why the newspaper has to pursue socio-economic issues and ignore stories that might be of intellectual interest but be of little practical value, Loewe said, "It is a bit like saying to someone: 'I know you have got no food to eat, but you should look at the red spot of Jupiter', or 'your house is leaking but please look at Jupiter'" (interview 16/07/2014).

The overriding importance of socio-political reporting at the *Daily Dispatch* did not imply that all other types of reporting, such as science journalism, were necessarily banished, but it did mean that the political desk had precedence in terms of access to resources and in terms of space in the news section. Loewe suggested that when science articles were published, they should be in line with the newspaper's agenda of helping struggling segments of the population to overcome the challenges precipitated by extreme poverty. He offered two examples of practical science articles consistent with the newspaper's editorial vision. In the first, science content could show rural people how to transform their tribal lands into productive gardens so that they can feed themselves. In the second, it could provide guidance for entrepreneurs on how to set up a business repairing computers and cellphones (interview 16/07/ 2014).

5.5.4.2 Readers' views as an outside influence on editorial decision making

The preferences or perceived preferences of the readership are key factors in deciding whether or not to publish an article about the sciences. In terms of the Hierarchy of Influences proposed by Reese and Shoemaker (1996: 178-219) readers preferences would constitute an outside influence on the decision making process of the newsroom, but in the case of the *Daily Dispatch*, it did not appear that any formal market research had been commissioned to determine what readers feel about science content. Deputy-editor, Brett Horner said the newspaper had had some market research done fairly recently but he did not know whether any questions were asked about readers preferences regarding the sciences (Horner interview 16/7/2014). He explained, "It [science] is not part of our editorial focus or editorial strategies … I don't get a sense that science features particularly large in our consciousness" (interview 16/7/2014). Horner's statement that the *Daily Dispatch* "has

always been a political newspaper" combined with his inability to remember whether recent market research had asked any questions about science, would confirm that politics is high on the list of priorities and science is not. For this reason, the editorial leadership make suppositions about readers' taste regarding science content and although they were all aware of this critical gap in their decision making process, none of them expressed concern about it.

Horner said he did not see a great need for science coverage in the *Daily Dispatch*: "I do question whether this is the market for it, but I don't know, for a dedicated page or column or daily reporting… maybe a weekly column or so" (interview 16 July 2014). Therefore despite the absence of any market research, Horner was confident that science content was not especially appealing to the newspaper's readership. It was plausible however, that at the time of this research, his intuitive assessments were correct since the *Daily Dispatch* was one of the few newspapers in the country growing its readership (Audit Bureau of Circulations, 2014). He attributed the lack of interest in the natural sciences to the South African education system that failed to ignite curiosity in pupils about science. He also considered the possibility of science being in conflict with the religious leanings of his readership and wondered whether the newspaper's readership was "perhaps too conservative for science". He said his newspaper was distributed in a conservative area where there was an innate tension between religion and science such that it was tacitly accepted that "If you are religious then you can't be scientific" (interview 16/07/14). The perceived sway of religion among readers was so strong that the editor, Bongani Siqoko, had considered appointing a religion reporter (Horner interview 16/07/2014).

Other members of the newspaper's editorial team revealed a variety of perspectives on readers' appetites for science coverage. There was however, broad consensus that well written science articles that are accessible to the majority of readers would always have a place in the newspaper. Macgregor said, "You've got to try and report on the science in a way that's not too scientific, in a way that actually stimulates people" (interview 12/05/2015).

5.5.4.3 Academic institutions as a source of science content

As universities are among the largest creators of scientific research, and are obvious sources of science content for news organisations, they naturally feature prominently as external influences in the Hierarchy of Influences Model developed by Reese and Shoemaker (1996: 178-219). It is reasonable to expect that journalists who periodically cover science matters would have regular interactions with local universities.

Three of the *Daily Dispatch* staff members interviewed for this thesis were scathing in their criticism of the academic institutions and their apparent reluctance or inability to engage constructively with the media. This aspect is relevant because there are two universities, Walter Sisulu and Fort Hare, with campuses in the same metropolitan area as the *Daily Dispatch* while Rhodes University in Grahamstown is well within the normal distribution area of the newspaper. Only one (Stent) of the six interviewees commented positively on her interactions with local universities. The criticisms can be distilled into two broad categories: the universities' structural incapacity to channel academic research from laboratories into the public domain and secondly, the poor communication skills of individual researchers.

Macgregor believes that more science stories would be published in mainstream media if the university communications departments were more proactive in performing their duties. He said the communications departments rely on academics to come to them with newsworthy research, but instead, the communications people should "go through department by department" to find the news (interview 12/05/2015). Macgregor said one of the key failings of the communication departments is that they do not understand the way news organisations work. He said that people often contact him and say, "we're having a meeting on Friday or whatever, and Joe Shmoe is going to be there" with the expectation that he will arrive at the meeting ready to write an article on it. Communication officers do not appreciate that he needs to pitch the story to his news editors in the newsroom to motivate why he should cover the meeting. He said a brief alert about an upcoming meeting is not good enough (interview 12/05/2015). Ray Hartle concurred with Macgregor about the difficulty of extracting newsworthy research from universities, however he argued from personal experience that the problem does not lie with the communication departments but rather with the scientists themselves[12]. He explained, "In my former life I was at UCT[13], I was the media manager there for two years and the big part of what we were doing, was promoting the research of the academics, and it is a struggle" (interview 16/07/2014). He put the blame squarely on the shoulders of the academics who work in little huddles and make no effort to communicate with the "big world out there". He said they do not acknowledge that they are part of the broader community (Hartle interview 16/07/ 2014).

[12] I sent emails requesting a response to the comments of the two senior reporters to all three universities mentioned above. Walter Sisulu and Fort Hare did not respond to my request at all. A Rhodes University official replied with a suggestion that I contact a different member of the communications team. I followed up with the suggestion but did not receive any further reaction.

[13] UCT – University of Cape Town

Not all interviewees at the *Daily Dispatch* have had conflicted interactions with researchers. Alison Stent, who as the designated research reporter for the newspaper before she became a sub-editor, had many positive encounters with scientists. She always found that everybody is interesting if you talk to them about what they are interested in, "and I think that is what I loved about being a reporter so much, is that you are so often talking to people about what makes them interesting" (Stent interview 16/07/2014).

It would appear that the stand-off relations between journalists and scientists are complicated and not easy to solve. The two workshops entitled *Science meets the Media in Stellenbosch I* and *II* referred to in Chapter Three of this study attempted to narrow the gap between scientists and journalists, but there does not appear to have been any follow-up research into whether that gap is narrowing or getting wider. Nevertheless, university based science departments continue to be one of the most useful sources of science news[14]. In the next chapter of this study, qualitative analyses of eight articles published in the *Daily Dispatch* during the research period reveal frequent referrals to university scientists for authoritative opinions on a range of topics.

5.5.5 Influence of ideology and socio-cultural context

The fifth level of influence, or the outer ring of influences that shape the production of news content according to the Hierarchy of Influences Model (Reese and Shoemaker 1996: 221-251), concerns the ideological and cultural context of the society where the news organisation functions. Large segments of the *Daily Dispatch* readership live in a society that for many decades suffered profoundly from turmoil and social upheavals brought about by apartheid policies and the consequent poverty that still impedes appropriate socio-economic development while other segments of the local population have lived a comfortable existence without being concerned about their basic requirements for survival (Amner 2010: 11-14). This means that the newspaper has a readership that is culturally and socially divided[15]. The

[14] Two science communications chairs were allocated to Stellenbosch and Rhodes Universities in 2014/15 in an attempt to improve interactions between scientists and the broader public.

[15] The *Daily Dispatch's* advertising agency, Times Media Ad Room, says that 70% of its readership is in the 7 to 10 LSM group meaning that its readers are in relatively high income brackets. In terms of racial groupings, the newspaper's readership is 80% Black, five percent Coloured, two percent Indian and 14% White.

situation is not much better from a political perspective because although eligible citizens have had the right to vote since South Africa became a democracy in 1994, not all voters have been able to exercise "effective citizenship" resulting in a "democratic deficit". Heller argues (2009: 125 cited in Amner 2010: 9) that political society, dominated by the ruling African National Congress (ANC), has taken advantage of its political power to steadily subordinate civil society and so extend the "democratic deficit". In the political domain, a democratic deficit usually leads to disillusionment with political processes and to voter apathy. In the field of science, a study published in the United Kingdom argues that a democratic deficit results in a declining trust in authority and expertise (POST 2001: 3).

Acting in the facilitative role of the media (Christians *et al.* 2009: 158 – 159) the *Daily Dispatch* has made a concerted effort to go some way to addressing this deficit by facilitating dialogues among members of the various local communities on the one hand, and between these communities and government officials on the other (Amner 2010: 14). The *Dispatch's* campaign to strengthen democracy corresponds with the Lay Expertise and Public Participation models of science journalism that prize a dialogic form of engagement (Secko *et al.* 2012: 69). This perspective sees dialogue as a democratic obligation that applies to all citizens – even scientists. Senior reporters at the *Daily Dispatch* who hold this ideological view insist that researchers have a responsibility to share their research findings with their compatriots. Hartle explained why he thought scientists are often reluctant to communicate with their fellow citizens:

> They have never been challenged. They have never been told that they are very much part of this community, that their funding comes from this community. The role they play should be inherently linked into what makes this community a better place for all of us (Hartle interview 16/07/2014).

Loewe acknowledged that not all researchers are hostile to the media and that he likes "dealing with scientists who like dealing with journalists". He added however, that some scientists are so arrogant that he actually wants "to wring their necks" because "they are not communicating anything to anybody. They are being arrogant, they are being undemocratic and who else knows what they are up to" (interview 16/07/2014).

As no journalist is assigned to the science beat and there are no daily routines or mechanisms that would see the *Daily Dispatch* actively searching for science content, such material would only find its way to the newsroom through other, non-specific channels. This would include

government press releases – most likely from the Department of Science and Technology (DST) or the wire services. None of the interviewees indicated that they had regular contact with any scientists but James did mention (interview 16/07/2014) that occasionally the East London Museum would take the initiative to contact the newspaper if it had a news story.

While the role of the science journalist has been examined in this thesis, the roles and responsibilities of scientists have not been adequately explored. There is however a degree of consensus in the *Daily Dispatch* newsroom that scientists are not living up to their democratic obligations as they tend to release their research findings to the general public indirectly through the media. Scientists are behaving according to the Deficit Model of science journalism by choosing when and whether they will release information instead of acknowledging their duty to engage more directly with the public and thus open the way for public participation in debating science issues.

5.6 Conclusion

This chapter presented the results of a quantitative content analysis of all 150 editions of the *Daily Dispatch* published in the first six months of 2014. The analysis was coded specifically for science content and aimed to determine how many science articles were published during the research period; what type of science they focussed on; who wrote the articles and how prominent they were. While science was the main news hook in only one of the 128 science articles published in the research period, the number of stories containing some scientific explanations was fairly high. The analysis showed that, in line with international trends, a high proportion of science content in the *Daily Dispatch* was related to health matters.

The second part of the chapter used interviews conducted with the editorial leadership of the newspaper to understand the decision making processes that determine which science stories should find their way onto the pages of the *Daily Dispatch*. The interviews revealed valuable insights into the various influences that shape the publication of news content in general and science content specifically.

The next chapter is a qualitative analysis of eight science related articles published in the *Daily Dispatch* during the research period. The first one was published in the first edition of the year and previewed scientific developments 2014. The remaining seven articles were part of a series about red tides that affected the Eastern Cape shores.

Chapter Six: Qualitative content analysis of selected articles

6.0 Introduction

In this chapter, eight science related articles published during the six-month study period are analysed with a view to gaining a qualitative understanding of how the *Daily Dispatch* covers the sciences. The first was chosen because it was a feature article predicting what important science events were expected during the course of the year and was therefore setting the agenda for science content in 2014. The remaining seven articles were part of a series describing the appearance of red tides along the Eastern Cape coast and how they affected local inhabitants. The series was chosen because it was fundamentally local, and drew on more locally based scientists than any other articles published during the research period thus conforming to one of the key news values identified by the deputy editor.

6.1 Science predictions for new year (Full texts in Appendix A)

Science coverage in the *Daily Dispatch* began in the first edition of the year printed on 3 January 2014 with an edited version of an article written by Michael Hanlon and published online in *The Daily Telegraph* on 31 December 2013 (Telegraph 2013a). Even though the article headlined *Science predictions for new year* (Telegraph 2014a) in the *Daily Dispatch* with 1,580 words and three photographs was the most substantial single science article published during the six-month period of this research, it had been significantly edited down from the original 2,310-word article published in *The Daily Telegraph*.

As the science preview was published in the first edition of the newspaper for the year it was making an implicit promise that it would cover the events and discoveries that it referred to. It would not be rational to make predictions about science advances and then ignore them when the promises materialised. In this sense, the *Daily Dispatch* created false expectations that it would be covering at least some of the major scientific developments in the following twelve months. It did not. Deputy editor of the *Daily Dispatch*, Brett Horner, claimed ownership of the idea to have a science preview for the year ahead. He said it was "something that came out of our December planning" (interview 16/7/2014) indicating that the editorial team had thought ahead and planned for such an article. Horner admitted that the *Daily Dispatch* was obliged to lift the preview article from *The Daily Telegraph* because it did not have a research reporter available to write a similar version from a South African or a regional perspective.

In explaining his decision to publish the science preview, Horner said the tone of *The Daily Telegraph* article was light and the content accessible for local readers "as it is not going to sell as hardcore science" (interview 16/7/2014). In effect, his decision was based on the "entertainment" news value for media organisations as proposed by Harcup and O'Neill (2001: 279). He saw the value of the article as undemanding entertainment because it was written in a light-hearted, sometimes colloquial style, that could ensure accessibility without sacrificing scientific accuracy. Readers would probably have been capable of understanding the piece if the writer had used more neutral terminology, but he wanted to keep the tone lively and conversational to make sure they remained interested throughout.

In an attempt to make the articles more prominent and conceivably less intimidating to readers, both the *Telegraph* and the *Dispatch* editions used stock photographs to illustrate their respective versions. They did not use the same photographs which were evidently sourced from different agencies. The lower word count for the *Daily Dispatch* version was largely achieved by leaving out two sections – the first about the possibility of the International Space Station (ISS) making an important enough discovery to justify its roughly R1.8 trillion price tag, and the second about the imminent granting of hydraulic fracturing licences for oil exploration in the United Kingdom. These two paragraphs were probably left out of the *Daily Dispatch* article due to a lack of space on the page, but an added reason was the fact that the second paragraph referred specifically to sites in the United Kingdom that would be of little concern to most readers in the Eastern Cape. However, if the hydraulic fracturing paragraph had been adapted or rewritten for the *Daily Dispatch*, it could have become relevant to the newspaper's readers as substantial hydraulic fracturing operations were planned for the Karoo Basin in South Africa (Vegter 2012: 9 and 10) and would thereby have justified publication in terms of the 'relevance' news value.

6.1.1 Traditional monitorial role and Deficit Model of science journalism still dominate

The article printed in the *Daily Dispatch* under the headline *Science predictions for new year* was written in the normative monitorial role of the media as it was keeping watch on what the scientific community was doing, and how it was using taxpayers' money. The monitorial role was reinforced in the section about the granting of hydraulic fracturing licences, but the inclusion of a Google Glass publicity photograph in *The Daily Telegraph* version implies that the newspaper might, in this case, have been collaborating with an advertiser. The Google Glass publicity photograph was not used in the *Daily Dispatch* article thereby suggesting the

East London newspaper wished to place greater distance between itself and its commercial interests. Both the English and the South African articles fit in the traditional category of information delivery, or deficit models of science journalism. They seek to translate scientific information to fill audience's perceived knowledge deficits about what the future holds, but while *The Daily Telegraph* article attempted to make the content relevant to its readers, the *Daily Dispatch* made little effort in this direction at all. Readers of *The Daily Telegraph* were reminded of the budgetary implications of the big science projects which their taxes would be sustaining and they were advised about the probable consequences of hydraulic fracturing projects in their areas. In this respect, *The Daily Telegraph* article is compatible with the Contextual Model of science journalism because it attempts to tie science to particular audiences and acknowledges that "science means different things in different locations" (Secko *et al.* 2012: 62). The *Daily Dispatch* article is limited to the Deficit Model of science journalism while the original takes on a combination of the Deficit and the Contextual Models. Neither version includes any input from lay experts nor members of the public and do not therefore come close to any form of the Public Engagement models.

6.1.2 Concluding remarks on preview of science for the year

In conclusion, the *Daily Dispatch's* preview of science for the year is written in an informal and accessible style but does not go a step further in attempting to make it locally relevant nor does it aspire to provide much more than entertainment value to its readers. This treatment, coupled with the placement of the preview in the Daily Life section of the paper, is a direct consequence of the editorial leadership's standpoint that science does not ordinarily fit into news pages but rather belongs in a more light-hearted, features section.

6.2 Red tides pollute Eastern Cape shores

6.2.1 Narrative description of how the *Daily Dispatch* covered the red tides

The *Daily Dispatch* published seven articles about red tides during the six month period of this research. (full texts in Appendix A) This extensive coverage is congruent with the thinking of the newspaper's deputy editor, Brett Horner, who made it clear that a science story should merit broad exposure if it is local and "it is our own people". He added, "It would have to be a pretty major breakthrough" to put a science story on the front page of the newspaper (interview 16/07/2014). Although the red tides did not constitute a scientific breakthrough, their appearance on the Eastern Cape shores represented a major news story

incorporating significant scientific elements and was the first science story to occupy the lead position on the front page of the *Daily Dispatch* in 2014.

Red tides are the result of sudden appearances of large volumes of algal blooms causing ocean waters to take on a red or reddish brown colour (Macgregor 2014a). The unusual tides were first recorded in Algoa Bay just before the 20th of January 2014 causing Port Elizabeth news and social media sites to post several articles about the phenomenon (Port Elizabeth, Nelson Mandela Bay 2014; Port Elizabeth ZA 2014). It is therefore not surprising that the first article (Times Media 2014a) about the red tide published in the *Daily Dispatch* was written by a Times Media reporter based in Port Elizabeth. The effects of red tides on humans depend largely on the specific strain of the algae and can vary from no consequences at all on one end of the scale, to death at the opposite end (Macgregor 2014b; Macgregor 2014d). The red tide articles printed in the *Daily Dispatch*, as well as comments published online centred on the following themes: the movement of the red tides along the coast; the rarity or frequency of such events; causes of the phenomenon; identification of the algal strain and consequences for humans.

6.2.2 News value of the red tides

The editorial decision to publish the red tide articles must have been intuitive and probably did not involve much conscious process of evaluation. Although it is unlikely that the newsroom leadership weighed up the news values on a rigid list of tick-boxes, the series complies closely with at least six of the ten news values proposed by Harcup and O'Neill (2001: 278-279).

- Entertainment value was carried in an unfolding drama as new developments became known and the public awaited the outcome of test results. The drama was heightened by the elements of mystery surrounding the sudden appearance of the red tides. Most people had no idea what caused the anomaly and there was uncertainty about whether the waters were dangerous or not (Macgregor 2014c).
- Surprise was a key element in the first articles of the series because few people had expected the red tides to penetrate so far up the east coast (Macgregor 2014d). Red tides were usually associated with the sea off the west coast of South Africa. A marine and red tide expert quoted in the first article of the series said that the tide experienced in Algoa Bay would not reach East London due to the direction the ocean currents flow along the east coast (Times Media 2014a). He was wrong (Macgregor 2014c).

- The Bad News value was central to the series as the tides potentially had negative consequences for the public health and local economy of the region. People were strongly advised not to swim in the sea nor eat seafood (Macgregor 2014c).
- Magnitude as a news value was present as the red tides affected to some degree virtually everyone living along the Eastern Cape coastal area. People were reluctant to eat seafood, fishermen lost business and recreational facilities were closed off. Magnitude was a factor not only because of the number of people it affected, but also because of the "unprecedented scale of toxic red tide" (Macgregor 2014a).
- Relevance was a pivotal news value as a large proportion of the *Daily Dispatch's* readership was affected by the tides. (Macgregor 2014b; Macgregor 2014c; Loewe 2014a)
- Follow-up was an inherent element of the series as readers waited for the next edition of the newspaper to find out whether they could eat the fish or swim in the ocean (Macgregor 2014c). The red tide story was already in the news, but readers had to read the next instalment to learn about new developments.

Considering how the above news values were integral to the red tide series, the decision to publish the articles must have been very easy. The editorial leadership surely did not waste time in deciding whether or not to publish but rather devoted their efforts to deciding how to construct the articles.

6.2.3 Hierarchy of influences on the red tide series

Two of the five levels of analysis as proposed by Reese and Shoemaker in their Hierarchy of Influences model (1996) are substantially present in the red tide series. The first of these levels, relating to the individual reporter, is particularly interesting because it reveals how journalists' personal leisure activities can significantly shape news content. Although the red tides presented a potential health risk, and the newspaper has a full time health reporter, Vuvu Vena did not have a by-line in the series. Six of the seven articles were written by two senior journalists who are also avid surfers, David Macgregor (four) and Mike Loewe (two). Macgregor[16], who as a competitive surfer is acutely aware of sea conditions, describes his close connection with the sea:

[16] *Surfing family in white wash* – article published in *Grocott's Online* 14 May 2014 describes how three generations of the Macgregor family compete successfully in regional surfing competitions. *http://www.grocotts.co.za/content/sport-surfing-family-white-wash-14-05-2014*

> Well, the sea is very close to my heart. I have had a connection from birth with the sea, and I've never lived far away from the sea. I surf a lot. I appreciate nature, anything that affects the ocean. So the starting point was already an interest in the ocean as someone who uses the ocean a lot. It was something that interested me off the bat and then I suppose another experience was surfing on the full moon and the bio-luminescence with my kids[17]. (Macgregor interview 12 May 2015)

It was because of his personal connection to the sea, and the fact that he lives in Port Alfred where the red tides were observed more than a month before they reached East London, that Macgregor was able to take the initiative on the news story and then keep it alive.

The Hierarchy of Influences model (Reese and Shoemaker 1996: 166-171) considers influences from outside the news organisation as a significant level of analysis. In the red tide series, external sources such as scientists and local officials played a substantial role in shaping news coverage. In their interviews for this thesis, both Loewe (interview 16/07/2014) and Macgregor (interview 12/05/2015) said they sometimes have rather fractious relationships with scientists who are reluctant to share information with the media, but in the case of the red tides, the scientists appeared to be cooperating with government officials and with the *Daily Dispatch*. The two senior reporters spoke to scientists and marine officials about health risks posed by red tides, and they wrote articles publicising warnings about the dangers of eating seafood or swimming in the ocean without ever citing a medical doctor or health official. The scientists and the reporters had a mutually supportive relationship for the duration of the red tide situation. The reporters needed explanations for their readers and the scientists wanted to disseminate information as a public service. As the main voices of authority quoted in the red tide series, scientists and local marine officials exerted considerable influence on the content of stories published. From a socio-economic perspective, because of the surfing background of the journalists, the series recorded the

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[17] When Macgregor was interviewed for this thesis, more than a year after the series was published, he spoke enthusiastically about surfing with friends and family in the red tide off the coast of Port Alfred. He said some ichthyologists had told him that because the red tide removed oxygen from the water there would probably be no fish around and consequently no sharks,

> So no sharks around, so we comfortably, six or seven of us jumped into the sea and we surfed for 45 minutes in the bio-luminescence and that really kind of was an experience one would never forget, because as your arms touched the water it just lit up. Your fins, as you pushed under you just had this amazing bio-luminescence and we all climbed out and I had to call my little one in because he just kept surfing in the dark in his black wet-suit. ... That experience was an experience one wouldn't forget. (Macgregor interview 12 May 2015)

views of surfers and people involved in recreational activities but largely ignored the economic consequences of the red tide for fishermen and local traders.

6.2.4 The *Daily Dispatch* collaborates with authorities and taps into lay expertise

The *Daily Dispatch* took on a role beyond that of simply monitoring the progression of the red tides as the newsroom made an effort to convey health advisories to its readership. If the newspaper had merely intended to carry out its journalistic tasks in terms of the normative monitorial role of the media, it could have written about the causes and movements of the algal blooms as well as articles about how the local authorities were dealing with the phenomenon. Instead of limiting its coverage to the monitorial role, the *Daily Dispatch* assumed a more collaborative position and worked with the local authorities to disseminate practical, and potentially life-saving information to its readers. In the first article of the series, it published the words of Dr Tommy Bornman, an expert in estuarine ecology, who warned people to avoid eating filter or shell fish, such as mussels and oysters, from areas affected by the tide (Times Media 2014a). The warning is repeated in the second article with the added caution from Bornman that people should "not eat the fish that are washing up [on the shores] before the fish have been sampled for toxicity" (Macgregor 2014a). The third article carried more complicated and somewhat more confusing messages as unnamed marine scientists declared that it was safe to swim but not so safe to consume shellfish (Macgregor 2014b). Specialist scientist, Dr Grant Pitcher, said the red tide along the east coast would not kill a person if they swam in it because it "did not produce paralytic shellfish poisoning like the species on the west coast – which is highly toxic and known to kill people" (Macgregor 2014b). In spite of the sometimes contradictory information it was sharing with the public, the *Daily Dispatch* content was perceived as being authoritative. The value of the newspaper's contribution was such that the spokesman for Portnet[18] East London, Terry Taylor said, "The articles in the *Daily Dispatch* were also distributed to all employees as a further awareness and the port's diving team sensitised to await results before undertaking diving duties" (Loewe 2014b).

The *Daily Dispatch* further engaged with the community *vis*-à-*vis* the red tides to adopt a normative facilitative role of the media by providing space for the exchange of ideas. It obtained a response from ichthyologist Dr Peter Britz to comments made in a post on a

[18]Portnet is a parastatal organisation charged with administering harbours in South Africa

prominent Eastern Cape diving website[19] about the possible consequences of the red tides. The post warned "that people could end up in hospital if they ate contaminated shellfish, or could experience skin irritation, burning eyes and respiratory problems if they swam in the water" (Macgregor 2014b). Britz was not quoted about the possible effects of swimming in the red tide but he did reiterate the warning against eating shellfish. In using information from the diving website, Macgregor effectively tapped into the Lay Expertise model of science journalism by recognising the knowledge gained through the divers' experience of local conditions (Secko *et al.* 2012: 68). Articles published on the two previous days had relied exclusively on the explanations and opinions of scientists or other experts in marine biology and were written according to either the Science Literacy Model of science journalism, filling the readers' knowledge deficit about the red tides, or the Contextual Model relating information about the red tides to the circumstances potentially faced by readers (Secko *et al.* 2012: 67 and 68).

When the red tide reached the East London coast, the *Daily Dispatch* reported on 6 March 2014 that the local authorities had closed the beaches, warned surfers to stay out of the water and advised people not to eat fresh mussels and other shellfish harvested directly from the sea. The front page article quoted Buffalo City Metro Marine Services Manager, Siani Tinley, as a source of authority warning readers against consuming shellfish. It also repeated the warnings of a specialist scientist, Dr Grant Pitcher, who said that the consumption of contaminated seafood could cause headaches, dizziness and an upset stomach (Macgregor 2014c).The top-down approach delivering important information from the public official and the expert scientist to the general public is typical of a Contextual Model of science journalism. The underlying assumption is that the public official and the scientist know what is best for the reader and it is the duty of the journalist to translate and convey this knowledge to readers (Secko *et al.* 2012: 67 and 68). Macgregor did not however, limit his articles to relaying the voices of authority - he tapped into the knowledge base of locals who had direct experience of the red tides. In an almost perfect example of the Lay Expertise model of science journalism, Macgregor recorded the opinions of Kerry Wright, a woman who runs the Millers Local surfing web site[20]. Wright said she had received some reports of people getting sick and, freely using surfer jargon, explained her diagnostic method, "I did get nauseous once after a five-hour sesh [surf session]. It is related to how bad it smells. The worse the

[19] Name of the diving web site is not revealed in the article.
[20] http://www.millerslocal.co.za/

smell, the worse the symptoms" (Macgregor 2014c). She was convinced that as long as the smell was not too bad it was safe to surf as, "It's the smell causing the symptoms because of the hydrogen sulphide – which is part of what is emitted when the stuff [algae] decomposes" (Macgregor 2014c). The *Daily Dispatch* article reinforced its Lay Expertise approach quoting a second surfer from Jeffrey's Bay who said he had not surfed in the red tide because the waves were small and the red tide "is still hanging around though, which sucks!" but he had heard of "one or two people getting sick from it".

Macgregor had also approached two fishermen on the local beachfront to find out what they thought about the red tide. It was clear from the published quotes that the fishermen had not been fully informed about the possible dangers of the red tide as they were going to continue fishing until they were told otherwise. One of the fishermen said, "It's my first time seeing this, but I hope it goes away soon because fishing is the only source of income for us fishermen" (Macgregor 2014c). The brief paragraph about the two fishermen was the only instance where the economic cost of the red tide for local fishermen was considered. This could be seen as an editorial lapse in the extensive coverage of a newspaper that prides itself on being relevant to the local population (Horner interview 16/7/2014). The red tide series carried ample coverage of the dangers to those who might consume seafood caught locally, but displayed only minimal concern about the hardships suffered by those who would usually provide that seafood.

In subsequent articles, the *Daily Dispatch* reporters reverted to the arguably safer information delivery tradition of relaying knowledge from the authorities and the experts to the readers (Loewe 2014a; Macgregor 2014d; Loewe 2014b).The last article of the series included however, a paragraph that matches the Lay Expertise model of science journalism. It quoted Portnet East London spokesman Terry Taylor who is not an expert on red tides, but as he represented a large parastatal organisation, it could be argued that he has a voice of authority and that his pronouncements are consistent with the Contextual Model of science journalism. Nevertheless his statement recognised that all personnel who work in the harbour had a meaningful role to play in facing the challenges of the red tides. Taylor said: "... as a precautionary measure we have requested our tug musters and crew members to be on the look-out for any dead or floating fish to the stern of vessels before the start-up of engines" (Loewe 2014b).

The *Daily Dispatch* published several more articles about red tides when similar occurrences were recorded in November 2014, but as these events were reported outside the period of this study, they will not be examined in this research.

6.2.5 Observations on red tide series

As the red tides were so significant, the newspaper would undoubtedly have published articles about the phenomenon if senior reporters Macgregor and Loewe had not been available. The appearance of red tides along the Eastern Cape coast was an important occurrence even for those who never went near the coast. However, as the two reporters are ardent surfers who are accustomed to spending their leisure time on the beaches, they were probably more sensitive to anomalies along the shore and it is therefore not surprising that their contributions were noticeably coloured by surfer perspectives. The series would certainly have turned out quite differently if Vuvu Vena, the newspaper's health reporter, had been assigned to cover the story, or at least contribute to it. While the issue of story ownership was not probed in the interviews, Loewe and Macgregor were probably able to write the red tide articles because newsroom culture allows for senior reporters to takeover more complex stories.

This series of articles about the impact of the red tides on the Eastern Cape coast broadly followed a combination of the normative monitorial and collaborative roles of the media. It assumed the monitorial role as it tracked the progress of the red tide along the coast and explained to readers what local authorities were doing to address the consequences of the tide. It followed the collaborative role as reporters actively worked with local authorities to disseminate relevant information to the *Daily Dispatch* readership.

6.3 Overview of other science content

The only other series of science articles published during the research period was about the annual Scifest Africa festival which took place in Grahamstown in March, 2014. The newspaper published four, positive Scifest Africa articles written by Port Alfred based senior reporter, David Macgregor (Macgregor 2014e; Macgregor 2014f; Macgregor 2014g; Macgregor 2014h) and it overtly collaborated with the event organisers, quoting Scifest Africa Director, Anja Fourie extensively without recording any dissenting opinions**.** The *Daily Dispatch* covered Scifest Africa as an event of interest to locals and to people interested in education. This event-based coverage conformed with the thinking of deputy

editor, Brett Horner, who stated that the newspaper prefers treating stories on an "event basis rather than going out and actively seeking science in our midst" (interview 16/7/2014). The rationale behind this approach is that the newspaper is only interested in news, and since it was unlikely that the lectures and workshops were going to produce breaking news, there was no point in covering those events in any way other than from an event perspective.

True to the normative monitorial role of journalism, the *Daily Dispatch* sought out news stories at the festival and reported on what was being done to avert water outages (Macgregor 2014e). It monitored how festival organisers coped with inclement weather (Macgregor 2014f) and how they worked with small budgets (Macgregor 2014h). The newspaper even found an unusual news-angle in the engagement of parents who were home-schooling their children (Macgregor 2014g).

The *Daily Dispatch* coverage was notable for its lack of critique of Scifest Africa 2014 thus reinforcing the impression that the newspaper was collaborating with the conference organisers rather than playing a watchdog role. There was also a subtle sense that the reportage of Scifest was performing an inferred patriotic duty by filling a gap "[i]n an environment where formal science education struggles to achieve acceptable standards" (Joubert 2001: 323). In this sense the newspaper was collaborating with the overall objectives of South African society and government.

Horner said that when the newspaper covered science stories, they were generally in the health sphere (interview 16/7/2014). He said that typically they might look at research done locally, or the health reporter might come across a paper published overseas about "some scientific breakthrough, cancer research or whatever the case may be", and then she would look for a local angle to complement the foreign research (interview 16/7/2014). The largest share (48.1%) of the 128 science articles published during the six-month study period were directly or indirectly linked to health matters. There were seventy-four articles that contained at least some health related science and of these, eleven belonged in a sub-category about dietary matters. These 'healthy eating' pieces tended to invoke scientific arguments showing how dietary habits could influence the health of people. The diet articles quoted a range of researchers who variously warned readers to consume less sugar; salt; and protein; to eat less junk food while pregnant but that diet beverages really do help people lose weight. One item advised readers to have a glass of wine occasionally to improve their eyesight and another explained why Prof. Tim Noakes is correct in advocating a high fat diet. There was also a

somewhat chilling article giving details about the link between eating home grown mealies[21] in the Transkei and oesophageal cancer.

6.4 Conclusion

The eight items analysed in this chapter constitute just over six percent of the 128 science related articles published in *the Daily Dispatch* between the beginning of January and the end of June 2014. While a figure of six percent may appear to be a reasonably representative sample, the articles considered in this chapter do not come close to an ideal of representativity as the variety of available subject matter was too great. Deacon *et al.* (2007: 45) say that in quantitative studies, common sense suggests that the larger the sample the easier it will be to guarantee the accuracy of the survey. They note however, that in qualitative studies the assumption that 'big is beautiful' can be directly challenged. This is because qualitative studies are less concerned with generating an extensive perspective than with providing intensive insights (Deacon *et al.* 2007: 45). This chapter intensively examined eight articles chosen to gain knowledge about how the newspaper dealt with topics of scientific interest. The selection was made with a particular view to finding out how staff on the *Daily Dispatch* approached local stories that carried some scientific interest, therefore six of the eight articles were written by staff reporters.

It is clear from the examination of the above stories that the *Daily Dispatch* favours the traditional Science Literacy or the Contextual Models of science journalism focussing primarily on information delivery. All the articles reflect a 'top-down' approach where the scientists, or some other voices of authority, reveal knowledge to the benefit of the reader. Macgregor occasionally extends his contributions drawing in a limited amount of Lay Expertise, but this is only done after the voices of authority have had their say (Macgregor 2014c).

The selected articles provided some interesting insights into how the attitudes and perceptions of editors shaped the science content published in the *Daily Dispatch.* The first article, promising fairly broad coverage of science in the coming year was proposed by Horner. It mirrored his personal interest in the sciences, but the newspaper's failure to deliver on its promises, suggested that he was sensitive to the lowly position of science on its list of

[21]South African word for corn.

priorities. It was as if he would like to publish more science but realised that it would not be possible.

This chapter has shown examples of how the attitudes and perceptions of senior editorial staff of the *Daily Dispatch* can have a significant influence on the publication of science content in the newspaper.

Chapter Seven: Concluding remarks

7.0 Introduction

This study was based on the preconceived notion that natural sciences are not adequately covered in the South African media. It was however, only a perception that needed to be tested before further investigation could ascertain the reasons for this presumed inadequacy. As an extensive survey of the general news media was not feasible, the focus of this research was narrowed to a single newspaper, the *Daily Dispatch* - a publication belonging to one of the largest media groups in the country, and a good example of South African print media. The expectation was that an in-depth examination of the way this newspaper functioned could serve as a test case of how a well-established regional newspaper covers the sciences. The *Daily Dispatch* was used to investigate the multiple forces that shape editorial decisions on whether or not the newspaper should cover science or not and how it should be covered. The forces that influence the decision making process include readership characteristics, newsroom skills, affordability of a science beat and the identity of the newspaper. In the case of the *Daily Dispatch*, its primary identity being that of a political newspaper is one of the key factors influencing the decision making process.

Interviews with six senior editorial staff members combined with a quantitative content analysis of science articles published over a six-month period, as well as a qualitative analysis of selected articles provided a multi-perspective view of how the sciences are treated in the *Daily Dispatch.*

7.1 General discussion

While preparing for this research, I had not expected to find many science articles published in the *Daily Dispatch.* I thought there would be a few items about astronomy, some about palaeontology and maybe a few others linked to whatever science developments were making the news. As it happened, the content analysis revealed that most science articles carried in the *Daily Dispatch* were about health related issues and especially about dietary habits. Its coverage of astronomy and palaeontology was notably weak.

Chapter Two showed that the civic republican and procedural liberal forms of democracy lead to two distinct kinds of media value systems where the one confers greater weight on the national interest while the other prioritises the public interest. The *Daily Dispatch* exists

in a media environment where the national press is accustomed to operating according to the liberal procedural form of democracy and working in the public interest (Wasserman and De Beer 2005: 196-199). However, historically the newspaper, including its current editorial leadership, prides itself on working for the 'common good' in accordance with the civic republican tradition. The editorial decision-makers at the *Daily Dispatch* are mindful of the struggle to survive faced by a large proportion of the population in its coverage area and they believe they have a duty to listen to the concerns of citizens who are fighting to be heard (Horner and Loewe interviews 16/7/2014). The *Daily Dispatch* unequivocally identifies itself as a political newspaper and has pro-actively engaged with the local communities through a series of town-hall-like meetings known as the Community Dialogues and the Dispatch Dialogues (Amner 2010: 68).

In terms of socio-political reporting, the editorial leadership functions in accordance with overlapping monitorial and collaborative roles of the media, but strives to take on a more facilitative role by providing platforms for engagement. When publishing articles on the sciences however, the *Daily Dispatch* reverts to a traditional monitorial role to the exclusion of other options. There are no community dialogues focussing on the sciences. In this top-down approach on science content, the newspaper applies the Deficit and Contextual models of science journalism where articles contain a transfer of information in a single direction from the scientists to the readers. This dichotomous approach to reporting on the sciences could be partly responsible for the relatively low number of science articles published in the *Daily Dispatch*.

Print media in South Africa has in recent years struggled to sustain its revenue stream as ever more people seek their news online. This predicament was exacerbated by the worldwide financial crisis in 2008. The *State of the Newsroom South Africa 2013* report reflecting on financial pressure on national news organisations noted that between 2008 and 2012, the circulation of daily newspapers had fallen by an average of 5.5% annually (Daniels 2013: 2). Amner explained the consequences of the changed business environment for the *Daily Dispatch*:

> At the end of 2008, the *Daily Dispatch* embarked on a process of offering voluntary retrenchments to a number of editorial staff members as a result of declining advertising revenue associated with the deepening economic recession. The size of the newspaper also contracted placing pressure on editorial space. While circulation held

> steady, the recession also negatively affected the affordability of the newspaper, especially in poorer communities.(2010: 64)

As the country eased out of the 2008 recession, the *Daily Dispatch* maintained its circulation figures better than most local newspapers, but persistent financial pressures resulted in further retrenchments in 2014. Strategies to ensure the financial sustainability of the newspaper confirmed ex-*Mail & Guardian* editor, Anton Harber's contention that "under tough economic conditions, specialist desks such as science are always the first to go" (cited in Ilbury 2012: 04). It is therefore logical to conclude that declining financial resources has been a contributing factor to limiting the coverage of the sciences in the *Daily Dispatch*.

One of the most significant findings of this research is the close correlation between the priorities of the senior editorial staff members and the set of science articles that were printed. This correlation answers the research question about how editorial attitudes influence the publication of science content in the newspaper. The deputy editor made it clear that science for the sake of science was not on the editorial agenda, and that scientific issues would only be broached if and when they might be directly relevant to the readership (Horner interview 16/7/2014). The importance of the 'relevance' news value was demonstrated in the most extensive series of science related articles published during the research period about red tides that affected Eastern Cape shores. In that series, scientific explanation had a part to play, but it was clear that the main focus was to apprise readers about the safety of consuming sea food caught in the tides and about the risks of participating in recreational activities on the local shores. The editorial claim of rigorous adherence to the relevance criterion was somewhat undermined by the frequent publication of articles about English soccer and American celebrities.

The *Daily Dispatch* editorial position (Horner interview 16/7/2014) that science content belongs in the lifestyle or entertainment sections rather than on the main news pages is characteristic of most newspapers in the country. This viewpoint, minimising the news value of science content, was addressed in a South African National Editors' Forum (Sanef) report tabled at its Annual General Meeting on 16 September 2011. The Sanef report identifies the editorial biases of senior editorial staff and their perceptions of readers' interests as the main obstacles to more extensive coverage of the sciences in the South African media (SANEF 2011). While the socio-economic circumstances of the target audiences, the political economy of the news organisation and the lack of science reporting skills are important

factors limiting the publication of science content, this research has shown that positions of the editorial leadership are pivotal in this regard.

7.2 What science news could/should the *Daily Dispatch* have published?

While the *Daily Dispatch* is clearly strong on health reporting it was relatively late in appreciating the gravity of the West Africa Ebola outbreak – described by *Scientific American* magazine as the most important science story of 2014 (Scientific American 2014). It was the biggest outbreak of the Ebola virus since it was discovered in 1976. The World Health Organisation reported the outbreak in March 2014 and by August it had declared an international public health emergency (WHO 2015). The *Daily Dispatch* carried four stories about Ebola during the research period – two were sourced from Reuters and two from AFP. All four articles were carried on news pages – but fairly deep in newspaper – two on page six, one on page eight and a small, 77-word filler on page nine. No attempt was made to get a South African angle – as it was not yet considered a big news issue in this country. It should be noted that during the research period, the Ebola outbreak was still in a relatively early stage of worldwide scare.

The newspaper published a total of eleven articles in the Space/astronomy sub-category in the research period. The first was published in the first edition of the *Daily Dispatch* in 2014. It was a preview of science in the year ahead[22] and had an implied promise to cover specific areas of space exploration, especially the progress of the Curiosity Rover on the planet Mars (Telegraph 2014a). The newspaper did not keep this promise, at least not in the first half of the year, even foregoing an ideal opportunity when the rover celebrated its first Martian year (687 Earth days) on the planet on 24 June 2014 (NASA 2015). The *Daily Dispatch* published two articles about the Square Kilometre Array (SKA) radio telescope that is currently being built in the Northern Cape. Both articles, written by Tamar Kahn of the Times Media Group, carried significant science content but in neither case was radio astronomy the main news angle. The only space related article to be published on page one, was in fact a crime story about the theft of meteorites from the East London Museum that included a scientific explanation about the importance of the stolen rocks.

Other high profile stories that the *Daily Dispatch* might have included in its coverage are: a new alphabet for DNA- giving life a bigger genetic alphabet; the sequencing of the tsetse

[22] This article is examined in greater depth in Chapter Six of this research

fly genome which causes the deadly sleeping sickness; globally, May 2014 was the hottest May on record, hence greater urgency about climate change; the Great Red Spot on Jupiter was decreasing in size; and on 26 February 2014, NASA announced that its Kepler Mission had discovered 715 exoplanets, increasing the total number of confirmed planets outside our Solar System to nearly 1,700.

7.3 Scope for further research

While the role of science journalists in the public understanding of science has been examined in this thesis, the role of scientists in this regard has not been adequately researched. How scientists in South Africa communicate with the general public and how they could do better, is a field worth exploring. There is also ample scope for further research in either broadening this study to include more print and broadcast media or alternatively narrowing it down to a content discourse analysis to add depth to our understanding of a particular aspect of science reporting. This study was limited to a only single publication but its results do not clash with those of a Stellenbosch University study of fifteen newspapers conducted by the Department of Journalism at the University of Stellenbosch in 2002 (Van Rooyen 2004). Audience research would be valuable to find out whether readers are satisfied with the current presentation of science content in the *Daily Dispatch,* as its senior editorial staffers claim, or do they require more and better science articles as asserted by the editor of the *Mail & Guardian* (Roper interview 31/7/14). It would also be worth examining the linkage between the South African education system, where pupils have historically not performed well in maths and science, and the editors' belief that readers are not particularly interested in science content.

7.4 Conclusion

In spite of the fact that the *Daily Dispatch* deputy editor Brett Horner said they don't 'really do science', over the six month study period the newspaper published a total of 128 articles that had at least some science content. This study showed however, that while some editorial staff members appreciated science news, there was broad consensus in the newsroom that socio-political news should invariably take precedence in the pages of the *Daily Dispatch*.

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Appendix A: Texts of articles examined in chapter six

Telegraph (2013a) Article published in *The Daily Telegraph*

Could this be the year we make contact with aliens?

From near-certainties to the far-fetched, Michael Hanlon looks at some of the science and technology headlines we may see over the next 12 months

Closer encounters: ETs may finally make contact this year

By Michael Hanlon

6:20AM GMT 31 Dec 2013

The Jubilee year of 2012 was a vintage one for science – as well as for our athletes and our Queen. This was the year that the Curiosity Rover landed on Mars, and the Higgs boson was finally smoked out. Nothing that happened in 2013 could quite top that, but notable discoveries and accomplishments of the past year included the confirmation that Nasa's Voyager 1 probe had finally entered interstellar space, the discovery of a new species of carnivorous mammal in South America (the Olinguito), the award of the Nobel Prize to Peter Higgs and his colleagues, and yet more evidence that traits and changes acquired in an animal's lifetime may be passed on to the next generation (the rehabilitation of the once-heretical doctrine of Lamarckism via the science of epigenetics). In this case, scientists in Atlanta, Georgia, found that mice scared out of their wits could pass on their fears to their young, even their grandchildren.

The year also saw growing evidence for a puzzling slowdown in global warming (almost certainly explained by the function of the world's oceans as a gigantic heat sink), the suggestion that our galaxy may be home to a billion or more "Earths" (making the continuing non-appearance of ET ever more mysterious), and China's further advance into space, with a successful landing on the Moon of a wheeled robotic rover. India, too, has entered the space premier league with the launch of the Mars Orbiter spacecraft on November 5.

Finally, 2013 was the year that someone at last managed to make the International Space Station (ISS) interesting, when Commander Chris Hadfield reprised David Bowie's Space Oddity in an extraordinary video shot aboard the station.

So what might 2014 hold? Here we look at some of the headlines from the world of science, technology and the environment that you may be reading in the next 12 months. Some of what follows is almost certain to happen, some is merely likely – and we have also made a couple of left-field suggestions.

First landing on a comet

Our machines have so far made successful landings on the Moon, the planets Mars and Venus, and Saturn's moon Titan. Next November a small robotic probe called Philae will

detach from the Rosetta spacecraft (a European mission to explore comet Churyumov-Gerasimenko) and land on its surface.

Comets are deeply mysterious objects. Though often called "dirty snowballs" due to their composition of various ices, including water, they are actually lumps of complex chemistry, including organic compounds. It should be stressed here that "organic" in the chemical sense means "contains carbon" rather than "alive", but that has not stopped some scientists speculating that comets, and objects like them, may act as cosmic dispersal systems for primordial microbes throughout the universe (a hypothesis called panspermia, which sounds crazy yet which has never been entirely discredited). Philae, some of whose components were built in Britain, may answer the question of whether comets supplied the early Earth with the bulk of its oceanic water. And it will provide some spectacular images.

The Large Hadron Collider completes its upgrade

The biggest and most expensive particle accelerator ever built is currently shut down for maintenance and a series of upgrades which will mean that, when it is switched on, it will operate at double the power it had at its disposal when it found the elusive Higgs boson. This will almost certainly not happen until early 2015, but Cern's scientists will spend this coming year poring over the countless petabytes of data produced by the LHC already, and preparing for the reactivation of a machine that may be able to solve some of the greatest mysteries in science, including the nature of dark matter and even the detection of parallel universes.

Google Glass hits the shops

Google does not work like other companies. Its prototype Google Glass headsets were not released conventionally, but sold to a selected group of "early adopters" and Google employees last year for $1,500 a pop. Google Glass is a type of "augmented reality" wearable computer, of the kind we have been promised for a decade but has conspicuously failed to materialise. The headset, which looks like a geeky version of a pair of spectacles, allows the user to overlay a transparent computer screen on their field of vision. Look at a building and the computer will flash up information about what it is. You can tell the glasses to take a picture or video, and although Google says it has disabled this function, the technology is there for instant face-recognition: you look at someone, and the magic of the web means that you can have a name, address and telephone number in the time it takes to say "stalker". Google Glass may end up being a game-changer of the like we have not seen since the first iPhone. Or it may be an overhyped dud. Given Google's record to date, the latter is unlikely.

First three-parent baby given the go-ahead

Parliament is due to vote in 2014 on a proposal to allow IVF clinics to offer treatment to couples where the woman suffers from mitochondrial mutations. Mitochondria are tiny "organelles", energy-factories that live in the cytoplasm of our cells. Problems with mitochondria can lead to a host of diseases, and faulty mitochondria are passed on down the female line.

Scientists have found a clever way round this. Take an egg cell from a donor whose mitochondria are healthy. Remove its nucleus (the bit with the mother's main DNA) and replace it with a nucleus taken from the mother. Then fertilise the egg, in vitro, using sperm from the father with conventional IVF.

The "three-parent" tag is a little misleading. The DNA that makes you "you" comes entirely from your mother and your father; this will still be the case with the new technique. But, importantly, the mitochondria from the donor do contain their own DNA, and this would be passed on to the resulting child. This would be the first time that assisted-reproduction technology will have been used to alter the fundamental genetics of a subsequent generation (albeit only affecting 0.1 per cent of its total DNA), a move that makes some people uneasy.

The ISS gets even more interesting

Chris Hadfield's YouTube rendition of Space Oddity made headlines in 2013 and finally made the much-derided ISS cool. But in 2013 the International Space Station may finally have made a scientific discovery of the magnitude that would justify its estimated £100 billion price tag (16 times as much as the LHC and, by most measures, the single most expensive object ever constructed).

In April 2013 an instrument aboard the ISS called the Alpha Magnetic Spectrometer (AMS), a particle detector, picked up an anomaly in the cosmic rays it was analysing – an unexpectedly large number of antimatter particles. This is interesting because one mechanism to explain this involves interaction between high-energy cosmic rays and a good candidate for the "dark matter particle", the neutralino – a heavy, stable critter that in theory has all the properties needed to explain dark matter.

If the AMS confirms in 2014 that it has indeed found dark matter – a large component of the "missing mass" of the Universe (the other being "dark energy") – that would be a spectacular triumph for the ISS, and a rebuttal of those critics who have dubbed it the ultimate white elephant. It would also probably mean a second Nobel for the instrument's lead investigator, MIT's Samuel Ting.

The internet continues to fragment

What many see as a worrying trend, the fragmentation of the internet into a series of "walled gardens" and more loosely connected networks, is set to continue apace in 2014. So far the internet, as a unitary entity free and open to all, has come under inevitable pressure from commerce. The development of smartphone-friendly apps and attempts to control traffic by content providers (violating the principle of "net neutrality", which says that the highways of cyberspace must allow all traffic unimpeded) together with the creation of censorship walls, by China and others, have been the greatest challenges to the old idea of the universal world network.

But now the antics of the American National Security Agency pose an even more serious threat. Because so much internet traffic goes through American servers (and thus comprises data that can be subject to NSA snooping) some countries, notably Germany, are talking about constructing their own mini-internets insulated from America's prying eyes. According to New Scientist, which quoted the Washington think-tank the Information Technology and Innovation Foundation, the growing distrust of America's online spooks could cost US businesses $35 billion in the next two years.

Fracking arrives in a field near you

Earlier this month, the Government announced that it would grant licences for thousands of exploratory wells to be dug in 2014 in the search for shale gas, the "fuel of the 21st century". Huge swathes of the country could be affected – it would be easier to list the places where geologists say it won't be found than those it might. The latter include Cornwall, much of Devon, southern East Anglia and some of the East Midlands, the Lake District, the Scottish Borders, most of Wales, and the Scottish Highlands. Shale gas – methane trapped in pore spaces in hard rocks deep underground – can be extracted by a controversial technique known as "fracking", or hydraulic fracturing. Opposition to fracking has to date centred upon supposed environmental damage and pollution (all unproven) and a slight risk of causing minor earthquakes; but if fracking gets under way in earnest, opposition will start to centre on land ownership and mineral rights issues, noise and traffic disruption. It is worth noting that to date not a single British kettle has been boiled by the energy from shale gas.

Curiosity finds something curious

Nasa's Mars mega-rover, Curiosity, which landed in Gale Crater in August 2012 and has been trundling around since, has made a number of interesting scientific discoveries. These include finding conglomerate rocks that were probably laid down in an ancient river, and recent confirmation that "life-friendly" conditions (ie, warmish weather and liquid water) pertained on this part of the Red Planet's surface billions of years ago.

But Curiosity has not found microbial life on Mars, nor evidence of past life. Its critics say it was a mistake not to equip it with a life-detector (such as was fitted to the twin Viking landers of 1976) and that Curiosity represents a missed opportunity. Perhaps, but there is a chance that the nuclear-powered machine could detect something interesting in 2014 as it begins its long ascent up the flanks of 18,000ft Mount Sharp, which lies in the middle of the crater. If Mars was ever home to microbial life, or even something bigger, then Curiosity might – just might – be able to spot the fossil evidence in the rocks. And it is possible – just possible – that it could even spot something alive: a very long shot, perhaps, but Mars is a very strange place and may yet surprise us.

Neutrinos come in from the cold

Only slightly less weird than dark matter, neutrinos are the fast-moving, fundamental particles that bombard the Earth (and you) in their trillions from all directions every second, yet which hardly interact with ordinary matter at all (on average you need about a light year

of lead to guarantee stopping one in its tracks). Being nearly massless, neutrinos are too light to account for the "missing mass" of dark matter itself, but cosmologists think that neutrinos, which come in various flavours, comprise a key, and as yet poorly understood, part of what makes the universe tick.

Because they are so hard to catch, neutrino science is in its infancy, but this year scientists using a telescope buried in the Antarctic ice detected high-energy neutrinos formed outside the solar system (the one light year of lead is an average for the amount of stuff you need to stop a neutrino; a very small proportion will be stopped by far less matter, such as several hundred metres of ice).

ET gets in touch

The longest shot of all, and there is no reason to believe that it is any more likely to happen in 2014 than the year after or indeed a thousand years hence. But that said, the more we learn about the universe the more, not less, curious it seems that we are apparently alone. When scientists including Enrico Fermi and Frank Drake first started seriously speculating about the possibility of extraterrestrial civilisations more than half a century ago, astronomers knew of only one solar system in the whole of the cosmos – ours. Now we know of more than a thousand, several containing apparently Earthlike planets, a handful of which may lie in their stars' "habitable zone", an orbit in which it is neither too hot nor too cold for liquid water to exist.

All this raises the question: where the heck is everybody? Given that we have the technology today (but not as yet the money) to build telescopes big enough to spot signs of life spectroscopically on nearby "Earth analogues", if intelligent life is as common as some suspect then it is certain that by now the aliens have used their telescopes to detect us. Maybe a signal is overdue. Or maybe someone is on their way. Or, of course, there is simply no one out there. The wonderful thing is that any of these possibilities is equally awe-inspiring.

http://www.telegraph.co.uk/news/science/science-news/10542591/Could-this-be-the-year-we-make-contact-with-aliens.html

Telegraph (2014a) Published on Page 10 in Daily Dispatch on 3 January 2014

Science predictions for new year

From near-certainties to the far-fetched, Michael Hanlon looks at some of the science and technology headlines we may see over the next 12 months

THE year of 2012 was a vintage one for science. This was the year that the Curiosity Rover landed on Mars, and the Higgs boson was finally smoked out.

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When scientists including Enrico Fermi and Frank Drake first started seriously speculating about the possibility of extraterrestrial civilisations more than half a century ago, astronomers knew of only one solar system in the whole of the cosmos – ours. — The Daily Telegraph

Times Media (2014a) Published on Page 2 of the *Daily Dispatch* on 27 January 2014

Caution over shellfish consumption

By SHAUN GILLHAM, gillhams@timesmedia.co.za

CONDITIONS are conducive for "red tide" along the East London coastline, but the toxic algae invasion that hit the coast between Port Alfred and Knysna is unlikely to reach here.

Marine and red tide expert Dr Tommy Bornman, who is also the Elwandle Node (marine) manager for the South African Environmental Observation Network, said yesterday the red tide experienced in Algoa Bay would not reach East London due to the direction the ocean currents flow along the east coast.

Bornman also confirmed, following analysis of the Algoa Bay red tide, that the red plumes were toxic.

He stressed earlier warnings for people to avoid eating filter or shell fish, such as mussels and oysters, from areas affected by the red tide.

"In terms of the potential for a red tide occurrence in the East London area, there appears to be a concentration of chlorophyll in the water … But a number of factors will determine whether the red tide actually occurs. In terms of shellfish consumption, it might be wise for people to exercise caution," he said. —

Macgregor (2014a) Published on Page 5 of Daily Dispatch on 28 January 2014

Global warming may be causing toxic red tide

By DAVID MACGREGOR, Senior Reporter

MARINE scientists yesterday warned that the unprecedented scale of toxic red tide in the sea off the Eastern Cape could be linked to global warming.

Stretching from Port Alfred to Port Elizabeth and beyond, the poisonous wave of red algae could be behind the deaths of several fish species that washed up at Sardinia Bay and the Alexandria dunefields on the Sunshine Coast at the weekend.

People have been warned not to eat fish or shellfish from areas where the visible red tide is until tests have been conducted into the health implications of the toxic tide.

Experts yesterday said the red tide was fairly common off the east coast at certain times of the year, but not the toxic species presently found in the Eastern Cape.

Rhodes University's head of ichthyology and fisheries science Dr Peter Britz yesterday said the number of toxic strains of red tide "blooming" in the province and other parts of the world had increased in recent years due to global warming.

Britz added it had been exacerbated by sewage flowing into the sea and increased shipping activity.

"The scale of the red tide in Port Elizabeth [and other areas] is unprecedented and may be a sign of things to come linked to climate change."

According to Britz, unprecedented ocean upwelling on the east coast was linked to an increase of east winds that had contributed to a decline in ocean temperatures over the past decade.

"In addition to the climate drivers, the probability and risk of future events is exacerbated by effluent discharged into the sea. Ships translocating toxic algal species in ballast water and encysted algae of the new species may re-emerge when environmental conditions are favourable."

He said the frequency of toxic blooms was on the increase around the world thanks to increased nutrient pollution.

Marine and red tide expert Dr Tommy Bornman of the South African Environmental Observation Network (Saeon) yesterday said samples of the toxic red tide had been taken over the past two weeks and plans were afoot to conduct another full ecosystem study of Algoa Bay and surrounds today as the red tide decays.

"This is a first for the east coast. The only other time this toxic species has been recorded in South Africa was in 1966 in Elands Bay [on the West Coast]."

Bornman said he was not aware of any tests being conducted on the dead fish found on some beaches. He called on authorities to prioritise tests “as ignorant people will collect and eat the fish”.

He said the dead fish could either be from direct toxicity or a lack of oxygen in the water from the red tide.

“My best guess is that the fish are dying because of oxygen starvation.

“I would caution the public not to eat the fish that are washing up before the fish have been sampled for toxicity.”

While experts grapple with the cause behind the red tide, photographers have capturing dramatic night shots of it lighting up the sea.

Macgregor (2014b) Published on page 3 of *Daily Dispatch* on 29 January 2014

Swimming's safe now but shellfish still not

By DAVID MACGREGOR, Senior Reporter davidm@dispatch.co.za

MARINE scientists studying the red tide along the Eastern Cape coast said yesterday it was safe to swim but warned against eating fresh shellfish harvested from the sea.The all-clear comes amid growing concern over the toxicity of the red tide and unsubstantiated claims that a person was admitted to hospital after eating contaminated shellfish.

Department of Agriculture, Forestry and Fisheries (Daff) specialist scientist Dr Grant Pitcher said although red tide algae was a common occurrence on South Africa's west coast, marine experts had never seen such a widespread distribution up the east coast between False Bay and East London.

Pitcher downplayed fears that swimming in the red tide could cause respiratory problems but warned of headaches, dizziness and an upset stomach if mussels, oysters and clams were harvested from the sea and eaten.

He said although there was some debate among experts on the toxicity of the type of red tide which had been found along the east coast, EU regulations advised people to be cautious.

But it would not kill a person they swam in it, he added.

According to Pitcher, the red tide phenomenon on the east coast did not produce paralytic shellfish poisoning

if like the species on the west coast – which is highly toxic and known to kill people.

"To date, toxicity tests done on the oyster farm produce in Algoa Bay have been negative, but there is always a bit of lag with these results. Although the identity still needs to be confirmed, it could well be a yessotoxin producer and, for this reason, people should not eat filter feeding shellfish," he warned.

Rhodes University associate professor and head of ichthyology and fisheries science Dr Peter Britz yesterday noted that the poison warning put out by some local experts was "overstated" and had subsequently been revised to "potentially toxic" by Daff scientists.

He said that although scientists agreed on the species of red tide on the east coast there was debate on the toxic effects. He had consulted algae bloom experts who said it was not as dangerous as initially anticipated. However, "as a precaution, don't eat shellfish," he said.

Britz's comments follow a post on a prominent Eastern Cape diving website which warned people could end up in hospital if they ate contaminated shellfish, or could experience skin irritation, burning eyes and respiratory problems if they swam in the water.

Since the red tide was first spotted on the east coast weeks ago, some dead fish have washed up on beaches. Species include musselcracker and blacktail. Experts say the fish did not die from red tide toxins but rather hypoxia caused by the plankton sucking most of the oxygen out of the water.

The phenomenon has attracted scores of people to Eastern Cape beaches every night to photograph the red tide that glows in the dark when it is stirred up by waves.

Jeffreys Bay photographer Deon Lategan said yesterday the long camera exposure time which had to be set made photographing the red tide frustrating, but watching it was an experience of a lifetime.

“When you walk on the wet sand it ignites beneath your feet and if you kick the water it lights up.” —

Macgregor (2014c) Published on Page 1 in the *Daily Dispatch* on 6 March 2014

Red tide invades EL beaches
Authorities warn bathers to wait for test results

By DAVID MACGREGOR

Senior Reporter davidm@dispatch.co.za with additional reporting by Aretha Linden

EAST London beaches were closed to bathers yesterday by Buffalo City Metro marine services officials after a "red tide" algal bloom was seen in city waters. Marine services assistant programme manager Siani Tinley yesterday said the closure was a precautionary measure to allow officials time to test the bloom that was blown on shore by days of northeasterly winds.

She also warned surfers to stay out of the water until the tests had been conducted.

Red tide is the common name used for a colony of red-brown micro-organisms which bloom at certain times of the year.

Although the red tide is believed to be the same non-toxic species that has been off the coast from False Bay to the outskirts of East London for several months, Tinley said it would be best to conduct tests before giving local beaches the all-clear.

Tinley said it was difficult to determine whether it was the same species of red tide found off the rest of the coast without doing tests.

"It could be the same as the Port Elizabeth red tide which is relatively harmless.

"However, we decided to close the beaches as a precautionary measure," she said.

Tinley said cold water from north east winds resulted in an upwelling of nutrients, and this encouraged the algal bloom.

She warned people not to eat fresh mussels and other shellfish harvested directly from the sea.

Two fisherman spotted along the East London beachfront said they were not informed about the red tide and they had received no warnings not to fish.

"We will continue to fish until we are told to stop and educated about the dangers this red tide imposes," said Eric Ngwani.

Kholisile Mafula said he did not even know what a red tide was.

"It's my first time seeing this but I hope it goes away soon because fishing is the only source of income for us fishermen," Mafula said.

When the Daily Dispatch first reported on the red tide around Port Alfred six weeks ago, Department of Agriculture, Forestry and Fisheries (DAFF) specialist scientist Dr Grant

Pitcher said they had never seen such a widespread distribution up the east coast – from False Bay all the way to East London.

At the time, Pitcher downplayed fears that swimming in the red tide could cause respiratory problems but warned of headaches, dizziness and an upset stomach if mussels, oysters and clams were harvested from the sea and eaten.

According to Pitcher the red tide phenomenon on the east coast did not produce paralytic shellfish poisoning like the species on the West Coast – which was highly toxic and known to kill people.

Since the red tide was spotted on the east coast weeks ago, several dead fish have washed up on beaches from Port Alfred down the coast past Jeffreys Bay.

Species include mussel cracker and blacktail. Experts say the fish did not die from toxins in the red tide but rather from hypoxia (lack of oxygen) caused by the plankton using up the oxygen in the water.

The phenomenon has attracted scores of people to Eastern Cape beaches every night to photograph the red tide, which glows in the dark when it is stirred up by waves.

The red tide was blown into East London's shores only late yesterday afternoon and the surfing prospects were poor, so surfers had yet to experience the tide.

However, surfers along the Sunshine Coast and in Port Elizabeth have had to put up with the tide for some weeks now.

Kerry Wright, who lives in Port Elizabeth and runs the popular Millers Local surfing website, said she had received reports of some people getting sick: "I did get nauseous once after a five-hour sesh [surf session]. It is related to how bad it smells. The worse the smell, the worse the symptoms.

"It's the smell causing the symptoms because of the hydrogen sulphide – which is part of what is emitted when the stuff [algae] decomposes."

She believed it was fine to surf as long as the smell was not too bad.

"It's fine hey. Just don't do a really long session if the smell is very strong. No smell, you fine. Mild smell, ok. [Bad] smell, have a quick sesh. Essentially the [side] effects are to do with hydrogen sulphide inhalation, and not directly from red tide itself, rather as a byproduct of red tide."

Jeffreys Bay surfer Carel Olivier said he also surfed in the red tide and had heard of some friends getting ill.

"I have surfed in the red tide. The worst days I haven't surfed cause it's [the surf] small and onshore and really bad. It is still hanging around though which sucks! I know of one or two people getting sick from it." —

Loewe (2014a) Published on page 5 in the *Daily Dispatch* on 7 March 2014

Beaches closed after algal bloom strikes

By MIKE LOEWE, Chief Reporter mikel@dispatch.

CITY authorities were rushing to test samples of the massive algal bloom, commonly known as "red tide", which appeared in the waters off East London's Esplanade at noon on Wednesday. Some algae, which can turn the ocean red, green or pink, are harmless, but others can be harmful, and Buffalo City Metro chief of marine services at the aquarium Siani Tinley was taking no chances.

Beaches remained closed and water sports and eating fish caught or shellfish gathered from the swathes of blood-coloured waters were not advisable.

Tinley said the huge size of the bloom was unprecedented in her 10 years at the aquarium.

She and local scientist Dr Alan Carter said easterly winds howling monotonously over January and February summer months caused an upwelling of cold water (17 to 19 degrees), which swept up nutrients from the ocean floor and disgorged them on the surface.

These conditions were just right for the appearance of the nutrient and oxygen depleting algae.

Carter said the conditions spawning the bloom were related to shifts in the climate.

Tinley did not rule out the possibility that the micro-organism was the same as the Lingulodinium Polydrum causing the red bloom off Algoa Bay, which stretched down as far as Mossel Bay, but test results would reveal the culprit.

By midday yesterday no

discoloration of the ocean was seen at Gonubie or Chintsa, but a dead penguin which washed ashore at Chintsa was being examined, said African Heartland Journey tour operator and local, Mike Denison.

Border Surfriders' Association's Mike Brent said they were waiting to see if today's west wind would shift the bloom away from Queensbury point, where a BSA competition is planned on Sunday.

Marine biologist Dr Barry Clark, who has been diving in Algoa Bay, said the visibility in the bloom was "close to zero".

"We have had it in Knysna for short periods, but now it has been hanging around for three months and that is unprecedented.

"We should be concerned if this is not just a single episode because it impacts on shellfish, fishing and humans.

“Water temperatures are definitely increasing and many tropical species are making their way down from Mozambique to as far as Mossel Bay.” —

Macgregor (2014d) Published on page 5 in the *Daily Dispatch* on 7 March 2014

Red tide here to stay, say scientists

By DAVID MACGREGOR, Senior Reporter davidm@dispatch.co.za

MARINE scientists studying the red tide that suddenly appeared earlier this week off East London beaches yesterday said it was here to stay. Although it may eventually disappear from sight for now, experts said climate change and ever altering weather patterns could bring the algal bloom back.

Renowned Rhodes University ichthyologist professor Peter Britz yesterday said they had never before seen such an "unprecedented and persistent wave" of red tide over the past two months stretching from False Bay to East London.

"It is a sign of things to come," he warned.

"When the species is here, it is here to stay and will come back quickly whenever the weather conditions are right."

Britz and Department of Agriculture, Forestry and Fisheries specialist scientist Dr Grant Pitcher said even though the red tide/algal bloom off East London had not yet been sampled by experts it was "very likely" to be the same lingulodinium polyedrum bloom stretching from around East London coast all the way down to Walker Bay.

They both played down fears the red tide was toxic, agreeing it was safe to swim, surf, fishing and enjoy other marine activities.

"A healthy bloom poses no real health issues," Pitcher said.

According to Pitcher the most likely negative impacts would be those linked to anoxia – a lack of oxygen in the water – and could lead to some fish dying.

He however said the bloom tended to die off in shallow inshore areas from a lack of nutrients – after consuming the oxygen.

"Satellite images indicate a fairly continuous massive bloom."

Britz said the spread was "arguably" a symptom of climate change which created unusual weather patterns.

He said red tide was spreading round the world in ship ballasts which contain water and said although humans did not get sick from red tide they should not collect and eat filter feeding shellfish like mussels. —

Loewe (2014b) Published on page 7 in the *Daily Dispatch* on 8 March 2014

Beaches reopen after algal bloom tests
By MIKE LOEWE, Chief Reporter

BEACHES along the East London coastline reopened yesterday after microscopic testing of the red algal bloom, which burst out in enormous patches of local surface water, was identified as the mildly toxic Lingolodinium Polyedrum micro organism. Buffalo City Metro's chief of marine services and marine biologist Siani Tinley said late yesterday afternoon that all water sports could go ahead, with the only warning being against eating shellfish, which accumulate the algae.

However, people with allergies were advised to err on the side of caution.

Westerly winds seemed to dissipate the vast red discolorations yesterday, but Tinley said the bloom was still present in the Buffalo River and harbour. Fresh water coming down the river, however, would cause the algae to die off.

Portnet East London spokesman Terry Taylor said: "Fortunately this red tide (algal bloom) has had no effect on our commercial activities. However, as a precautionary measure we have requested our tug masters and crew members to be on the look-out for any dead or floating fish to the stern of vessels before start-up of engines. The articles in the Daily Dispatch were also distributed to all employees as a further awareness and the port's diving team sensitised to await results before undertaking diving duties."

Tinley said: "It is a low-toxic algae, and people using the sea should be fine."

Fish caught by anglers could be eaten, but people with had to take care.

Following a frantic week, Tinley said: "I am relieved that it is nothing serious and we can open our beaches which are very busy at this time of year." — mikel@dispatch.

allergies

Macgregor (2014e) Published on page 3 in the *Daily Dispatch* on 11 March 2014

Past water outages not a threat to this year's Scifest

By DAVID MACGREGOR, Senior Reporter — davidm@dispatch.co.za

THE organisers of Scifest Africa – the continent's biggest science festival – yesterday said they were confident last year's water outages that caused widespread public anger in Grahamstown would not happen again. Toilets and taps ran dry at some venues and accommodation establishments last year as a record Scifest crowd of 62 000 people flooded into the City of Saints to be wowed by the wonders of science.

Although the annual science extravaganza drew rave revues, the water shortages caused widespread anger and sponsors threatened to look at other Eastern Cape cities to host the event if the problem was not solved.

Scifest Africa director Anja Fourie yesterday told the Daily Dispatch they had been meeting with Makana municipal officials in the build-up to this year's six-day instalment – which begins tomorrow – to prevent the problem occurring again.

She said she was confident the Makana municipality would pull out all stops – including delivering water in tanks if needed – to keep the 18-year-old festival in Grahamstown.

Although the exact economic impact of Scifest on the local economy has not been worked out, she said it contributed millions each year and was the second biggest cash spinner for the city after the National Arts Festival.

According to Fourie, this year's Scifest, themed Into the Space, was the biggest to date and had more than 500 different items on the programme.

She said although the local event only had an annual budget of R3-million to put on Scifest Africa they still managed to pull it off every year despite competition from heavy hitters like the Abu Dhabi science festival which has a R100-million budget a year.

Scifest spokesperson Joy Matambo said even though keeping Scifest fresh and new after 18 years was a challenge they had managed it again thanks to the space theme.

"This year has a very different feel and we have a very strong presence from foreign high commissions as many are collaborating with South Africa on the Square Kilometre Array (SKA)."

She said there were many positive spinoffs from SKA being set up in South Africa.

"We always try to find exhibitors who have interactive exhibitions that will engage people," said Matambo.

"Scifest is not a career expo. It is not boring and static – it is fun and exciting because we always try to engage with the public."

Macgregor (2014f) published on page 2 in the *Daily Dispatch* on 13 March 2014

Young bright minds feel vibe of science fair

By David Macgregor, senior reporter, *davidm@dispatch.co.za*

Rain and cold weather did not dampen the enthusiasm of thousands of young scientists who flocked to Grahamstown yesterday for the start of Scifest Africa.

Although Scifest Africa director Anja Fourie said they had received some cancellations from pupils at nearby township schools battling in morning rain to find transport, she said they had made a plan to help get them to the continent's biggest science education extravaganza.

"They can't walk in the rain so we are sending transport our to collect them."

Although there are more than 500 events on this year's packed programme, themed Into the Space, only one activity was planned outdoors – and it was quickly moved inside the National Monument building to avoid disappointment.

"The weather is going to clear to we will be able to hold out outdoor activities over the rest of the week," she said.

Fourie said the fun run and a new feature on the programme – the Scipicnic in the magnificent Botanical Gardens nearby – would be held on the weekend when sunny weather is predicted.

The only exhibit moved indoors yesterday was the Iziko Museums mobile stand – which travels the Western Cape introducing youngsters to the thrills of science and the environment – and hundreds of kids flocked to look at and touch the displays on the evolution of life on the planet.

Despite the icy weather, 52 eager Foundation Phase children and their science teachers from the Ginsberg Seventh Day Adventist Church in the impoverished township near King William's Town said they were glad they made the early morning haul to Grahamstown.

Teacher Sharva Lawrence said they had been making the trip for years as it helped to get youngsters turned on to the wonders of science – even though the school laboratories were poorly equipped.

"Scifest teaches the children to love science. The whole school attends over different days – it is a highlight for students and teachers."

Lawrence said it was "very important" to get children hooked on science from a young age and after 18 years Scifest was still the best platform around.

"We have senior students at our school who want to become scientists, doctors and engineers after attending Scifest."

According to Fourie, this year's programme was the biggest ever and had attracted scientific interest and participation from all over the world.

"Scifest has changed a gear completely as people who decided on a career in science after coming to Scifest years ago are coming back to inspire the next generation.

"Eighteen years down the line parents who came here years ago when they were young are coming back with their children."

Scifest Africa ends on Monday. —

Macgregor (2014g) Published on page 2 of the *Daily Dispatch* on 14 March 2014

Science fair a hit for pupils - Homeschoolers also benefit from extravaganza

By DAVID MACGREGOR, Senior Reporter — davidm@dispatch.co.za

SCIFEST Africa is proving a big hit among budding young scientists learning through homeschooling across the Eastern Cape. Dressed in civvies, the homeschoolers are easy to spot among the gaggle of eager youngsters from traditional schools who flock to Africa's biggest science extravaganza in crisp white shirts, blazers and ties.

Eastern Cape Home Schooling Association (ECHSA) chair Lindy Greaves yesterday said Scifest was a highlight for many children – and their parents – who had opted for a less mainstream education.

She said the event exposed children to a plethora of inspirational local and international scientists and topics they would normally not encounter.

"We can simulate a lot of the things in the kitchen at home but the costs can be exorbitant," Greaves said.

"At Scifest, things are very reasonably priced and we try to take the kids to as many things as possible."

The Boknes based mother of three children – Joel, 12, Emma-Lee, 10 and Shelley, 7 – said interest in homeschooling was growing, and ECHSA received seven queries a week from parents keen to try an alternative to mainstream education.

"When you are doing homeschooling, you are not confined to between four walls for a certain amount of hours per day – you are learning all the time."

Jansenville farmer Fransie Fourie and his wife Maryna said they decided to homeschool their three daughters five years ago instead of sending them off to boarding school and only seeing them on weekends.

"Homeschooling our children has nothing to do with politics or religion – we live one and a half hours from the nearest school and we did not want to miss out on seeing them growing up."

However, the couple sent their 14year-old daughter, Engenie, to boarding school this year to get some "street" wisdom.

Boesmansrivier mother Liezelle Chowles said she had also enrolled her eldest child, Michaela, 16, in a mainstream school this year as a weekly boarder after homeschooling her three years.

Her two younger children are still doing homeschooling. “We decided from a spiritual point of view that we wanted to homeschool our children so we could instill our own values, morals and principles in them.”

She said although Scifest – and acclaimed acts like Dr Steven Ashworth Kitchen Science, which uses household items to woo pupils to the children for the past

five wonders of chemistry – were a highlight, homeschooling was a lot easier nowadays thanks to the internet and other information sources.

According to Ashworth, science was all around – even in a kitchen.

Based at the University of East Anglia in England, Ashworth – who has made many trips to Scifest over the years – said household and kitchen items provided as good a platform to learn the wonders of science as school laboratories.

“The homeschoolers and their parents love it … they say it is great to know there are inexpensive things they can do at home.”

Scifest spokesperson Joy Matambo said there were plenty of other items on the programme that would also benefit homeschooled children.

“There is a lot of stuff at the workshops that they can take away and try at home.”

Macgregor (2014h) Published on page 2 of the *Daily Dispatch* on 18 March 2014

World-class event on a tiny budget, Scifest Africa praised by foreigners

By DAVID MACGREGOR, Senior Reporter — davidm@dispatch.co.za

IT MAY not have the biggest budget in the world, but that does not mean Scifest Africa is not world class. Overseas scientists yesterday said that although the biggest science festival on the African continent had a miniscule R3-million budget compared to R100-million in Abu Dhabi it was still one of the best around.

Dr Graham Walker, an Australian and one of only two people in the world with a PhD in science shows, said Scifest Africa had learned over its 18 years what works when it comes to inspiring the next generation. "It's amazing – Scifest resources are so limited, yet they put on a world class show every year."

Walker, who has also attended science festivals in Abu Dhabi, Malaysia and Australia, said production may be slicker in wealthier countries – where everything was "bigger, shinier and more extravagant" – but the interactive element was what really inspired the youth.

"A lot of kids in South Africa are not as fortunate as others around the world, and that is why I really like going on Scifest outreaches in the township. You have to make science the star of the show and Scifest is good at doing that."

Japanese science teacher Hideo Nakano, who travels the world doing volunteer internship work at poor schools across the continent, said Scifest Africa was one of the best gateways into science and technology for children – even those from under-resourced schools.

"You have to expose small kids to science to have the biggest impact.

"These science missions are so exciting. The children and teachers in South Africa seem much happier, even though they have far less than those in Japan."

Nakano uses simple throwaway items like drinking straws, elastic bands and old plastic to make amazing recycled rockets and planes that show the wonders of science even on a shoestring budget.

UK-based scientist Dr Stephen Ashworth, who has been to six Scifest Africa events, said it was his favourite event as he got to inspire disadvantaged students and teachers to do science using simple, everyday items – including ingredients found in most kitchens.

Ashworth takes annual leave from his University of East Anglia job to come and inspire South African kids because he believes he can "still make a difference" by turning on the next generation to the wonders of science.

"South Africa's scientific future is bright – there are lots of good people working in universities, lots of up and coming students. And Scifest is a major key to getting more young people involved."

He said year-round outreach programmes by Scifest Africa helped to inspire learners at poorer schools without even coming to Grahamstown.

Ashworth has clocked up 11 000km on a three-month South African road trip bringing science to people across the country.

Fears that Grahamstown's notorious water supply problem could sink sponsorship of the event were unfounded this year and taps have not run dry as they did before.

Scifest director Anja Fourie said children and teachers from across South Africa and even Lesotho had attended this year's event.

She said Scifest's future in Grahamstown looked good after the Makana Municipality pulled out all stops to ensure there was water.

Scifest ends tonight.

Vena (2014a) – published on Page 3 in the *Daily Dispatch* on 28 April 2014

Looking at obesity from a disease standpoint

By VUVU VENA, Health Reporter vuyiswav@dispatch.

Declaring obesity a disease in South Africa may be one of the solutions in fighting the impacts of this condition. The United States recently declared war on obesity when the American Medical Association (AMA) classified it as a disease.

Dr Dominique Stott, executive for medical standards and services at the Professional Provident Society of South Africa, a mutual financial services company, said such a declaration could have major implications.

She said 12-million children and 78 million adults in America were obese.

According to the Medical Research Council, two thirds of women and a third of men in South Africa are either overweight or obese.

"A disease implies that there is a malfunction in a body part or bodily function. By declaring obesity a disease, health control and monitoring authorities are effectively ensuring that obesity itself is treated as an illness, and not just the resulting long-term complications," said Stott.

She said obesity can lead to a steady rise in non-communicable diseases which added to an already over-burdened healthcare system.

Speaking to the Dispatch, Stott said classifying obesity as a disease meant the potential to be obese could be caught in overweight people before it progressed.

"Prevention and intervention can be done on the level of overweight. It's the obesity that brings on all the other problems like hypertension, strokes, blindness, kidney disease, diabetes, cancers, arthritis and heart issues," she said, adding that most were preventable.

Looking at American statistics, Stott said if the problem could be addressed in children at an early stage it would have a great impact on how they interacted with food as they grow up.

"Obesity is not simply a case of eating too much and exercising too little. It's more complex and not medically understood. Hormonal, behavioural, genetics and family history, education and economic [factors] all play a role."

Though research has been done into the condition, there have been no magic solutions.

Stott reckons if it were a disease, more money would be injected into research, not only for medical reasons but also how to include components such as education and socio-economic situations that lead to obesity.

“The problem in South Africa is that all we see in the medical aid industry is an escalating problem, with applicants with body mass indexes [BMI’s] as big as 50 [should be under 25 for normal weight].

“This has an impact on other covers such as life insurance where they end up paying more.

“Most join when they’ve already developed complications,” Stott said.

BMI is the universal measure used to determine obesity. It takes a person’s height, gender, weight and age and works out how much that person’s healthy weight should be.

The weight is divided by the square of the person’s height.

Anyone with a BMI over 30 is classified as obese. According to the World Health Organisation, obesity is defined as abnormal or excessive fat accumulation that presents a risk to health.

Stott admitted that BMI was not a perfect measure, but added it was one of the best they had.

“People who have a lot more mass around the middle have a far greater tendency to develop a metabolic illness such as diabetes than a person who carries a lot more weight on their buttocks and thighs,” Stott said. —

Appendix B – Interview guide for interviews with senior editorial staff members of the *Daily Dispatch*

Name: Age:

Role:

1. How does editorial structure work?:
2. How often do you hold editorial meetings?
3. Who chairs the meeting and to what degree does this person influence meeting?
4. How does copy tasting work?
5. Do you have a beat system? How strictly is it applied?
6. Do you have a science editor? Reporter?
7. Do you have a technology editor? Reporter?
8. Does anyone on your staff pitch science stories? Technology stories?
9. Do you have an editorial policy (formal or informal) on whether to report on science topics? Technology topics?
10. How do you decide to either use or not use a science story?
11. What types of science stories are you more likely to use:

(never ever; not often, only as a filler; regularly; as often as possible)

- Health
- HIV Aids
- Environmental issues (poaching, alien plants)
- Climate Change
- Astronomy
- Square kilometre Array. Have you devoted much space to SKA? Why?

- Biology
- Palaeontology
- Evolution
- Physics
- Others

12. When you do cover matters of scientific interest – where do you source the stories – from your own reporters or external sources – Times Media – Wire services – Web sites?
13. Do you have reporters who are interested in writing science stories?
14. Do you have reporters who are able to write science stories?
15. What do your readers feel about science stories? Do they like them? Do they want more?
16. How do you know this?
17. Are there impediments to you doing more science stories?
18. Would the views/interests of advertisers have any bearing on whether you do science stories or not?
19. Other issues you think might be relevant?

Appendix C: Coding manual for content analysis

The following coding manual was used in the quantitative content analysis of the 150 editions of the *Daily Dispatch* and the *Saturday Dispatch* published in the first six months of 2014

Date – the date of publication

Page number – page that article is published on

Headline – direct transcription of the headline over published article

Description – brief description of contents of article and, where possible, give an indication of the quality of the science content

Other Comments – explain where on the page article is published, which sections of the newspaper and any other relevant information

Source – name of reporter and/or other sources (e.g. wire service)

Category – the content fits most appropriately into which science category?

Word count – how many words in the article?

Photographs – number of photographs, if any. Include source of photograph

Graphics – number of graphics, if any. Include source of graphic