CHAPTER TWO

PROSOPOGRAPHIC AND SCREENING ANALYSES OF MEMBERS OF THE GSL COUNCIL: 1807 - 1850

Following a review of the relevant literature, prosopographic and associated screening techniques are used here to highlight changes and trends in the composition and nature of members of the GSL council during the first half of the nineteenth century; to identify members of an emergent geological elite, and ascertain any relevant characteristics in common; and finally, to detect any factors that may have had a significant influence on Mantell's career.

2.1 LITERATURE REVIEW

The scope, approach and nature of this chapter is essentially sociological, since any analysis of members of the GSL council in the first half of the nineteenth century must take into account the changing nature and structure of English society during that period, the reasons for the formation of the GSL in 1807, the perceived role of such societies by the various class and special interest groups involved, and the trend from an amateur ethos to one of professionalisation. Consequently, the following main themes are reviewed:

- English social classes and status stratifications during the first half of the nineteenth century.
- The Reform movement in the 1820s and 1830s.
- The status and nature of English geology, and the role of specialist natural history societies, before 1807.
- The origins of the GSL and the motivations of its founder members.
- The concepts of the 'gentleman-amateur', 'gentleman-geologist', 'gentlemen of science' and 'gentleman-specialist'.

- The professionalisation of English geology.
- The emergence and nature of an English geological elite.
- The use of prosopographic techniques by historians of science.

2.1.1 SOCIAL CLASSES AND STRATIFICATIONS

In order to identify and highlight specific social trends and patterns in the prosopographic and screening analyses, it is first necessary to assign a social status categorisation to each of the 169 members of the GSL council elected before 1850. But as Morris[1] has pointed out, fundamental changes in social relationships occurred between 1780 and 1850, due to political, economic, and technological changes associated with the industrial revolution. After 1780, the language and customs of 'ranks' and 'orders', with its acknowledgment and acceptance of hierarchical inequality, was slowly replaced by the language of class and social conflict. In many respects Mantell's situation epitomises these changing relationships. He was born in 1790 in the market town of Lewes in the south of England, the son of a politically radical shoe-maker, and in a local society where each rank and station knew its place, duties and rights. During the 1820s, Mantell was a successful and highly ambitious surgeon-accoucheur, still living at Lewes, but his social class and status at that time is best described as marginal. Twenty years later, when based in London, Mantell was indisputably a member of an acknowledged, professional middle-class.

According to Laslett[2] there was effectively only one class in the eighteenth century, the aristocracy, capable of exercising collective political and economic power. The rest of society comprised a large number of status rankings, not to be confused with social class. By the 1830s, however, the terms 'working-class' and 'middle-class' were part of the language and reflected social tension within English society at that time.[3] Neale[4] described these social classes as essentially conflict groups; they were based on authority and subjection, and concerned with the distribution of wealth and power.

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[1] R.J. Morris, *Class and Class Consciousness in the Industrial Revolution 1780-1850*, The Macmillan Press Ltd., London, 1979, p. 9.
[2] P. Laslett, *The World We have Lost*, Methuen, London, 1971, pp. 23-54.
[3] Morris, *op. cit.* (note 1), p. 9.
[4] R.S. Neale, *Class and Ideology in the Nineteenth Century*, Routledge and Kegan Paul, London, 1972, pp. 19-20.

In 1828 MacKinnon[5] classified the population of Great Britain into three main classes. The upper class was defined as those individuals who had the means of supporting at least one hundred men fit for labour, which equates to a minimum annual income of 3,000 pounds for each member of this class. The middle class was separated into two sub-divisions; the first part consisting of those who could command the labour of from twenty to one hundred labourers, and the second to those constantly demanding the labour of two to twenty labourers at 12 shillings a week. Consequently, the income ranges of the two divisions of the middle class were 3,000 to 600 pounds and 600 to 60 pounds.[6] Likewise, the lower class was broken down into two sub-divisions based on those individuals who could demand the constant labour of two labourers. MacKinnon's contemporary class classification was therefore based solely on economic criteria.

Most literature concerned with class analysis after 1800 accepts or implies a three-class model. In 1972, Neale[7] proposed a five-class model for the period by introducing two new classes, namely those portions of the middle and lower classes that did not have a developed class consciousness, and were deferential to the class above them. Morris[8] was critical of this approach, since it confused class divisions with status or stratum divisions. Class groups are basically conflict groups and are not necessarily synonymous with the more numerous stratums or levels of status within a society. In this regard the work of Weber[9] is relevant. He distinguished between class, status, and party as three types of competing social organizations.[10] For Weber, classes are determined by economic criteria and are not communities, but categories of population. On the other hand, people identify themselves with status groups that comprise distinct communities, distinguished by common life-styles and values. Each person and group can be placed according to the degree of 'social honour' accorded them by the rest of society. In doing so, the more important determinate factors are family background, occupation, size and nature of wealth and income,

[5] W.A. MacKinnon, *On the Rise, Progress and Present State of Public Opinion in Great Britain and Other Parts of the World*, Saunders and Otley, London, 1828, reprinted Irish University Press, Shannon, 1971.
[6] *Ibid*., pp. 3-4.
[7] Neale, *op. cit.* (note 4), pp. 29-34.
[8] Morris, *op. cit.* (note 1), pp. 33-34.
[9] Max Weber (1864-1920). German sociologist and economist. H.H. Gerth and C.W. Mills (trans. and eds.), *From Max Weber: Essays in Sociology*, Routledge & Kegan Paul Ltd., London, 1948.

religion and type of education.[11] Above all, the concept of social status is comparative, and its dimension is prestige. It consists of points along a vertical continuum.[12]

Although there is a wealth of twentieth-century literature concerning contemporary social status gradings and classifications, there is relatively little explicit material relating to the first half of the nineteenth century. Such knowledge was usually taken for granted, as in the novels of Jane Austen, in which the gradations in county society were known precisely.[13]

Most of the sociological literature pertaining to the history of geology and specialist scientific societies uses the language of class and an explanatory basis of class interests. For example, Porter's account of the respective roles of the rich land-owners and the canal engineers and surveyors in the development of geology in the late eighteenth and early nineteenth centuries is a class-based analysis.[14] In a broader context, Berman[15] has argued that the evolution of the English scientific community can only be understood when seen within the framework of the cultural imprint of an upper class.

The concept of class divisions is thus pertinent to an understanding of both the changing structure of English society in the early nineteenth century and the motivations of the different groups involved in the development of geology. However, the three basic class divisions of upper, middle, and lower are not sufficiently specific or distinctive for use in the prosopographic analyses. Three social status stratifications, within each of the upper and middle classes, are adopted here as a basis for social differentiation. The increased number of sub-categories enables less obvious trends to be discerned, and changes in the status of a particular individual, such as Mantell, and Lyell's father-in law, Leonard Horner,[16] to be monitored.

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[10] *Ibid.*, pp. 180-195.
[11] Morris, *op. cit.* (note 1), p. 63.
[12] T.A. Lasswell, *Class and Stratum: An Introduction to Concepts and Research*, Houghton Mifflin Company, Boston, 1965 p. 48.
[13] Jane Austen's novel, *Pride and Prejudice*, was first published in 1813.
[14] R. Porter, 'Gentlemen and Geology: The Emergence of a Scientific Career, 1660-1920', *The Historical Journal*, 1978, *21*, pp. 814-816.
[15] M. Berman, ' "Hegemony" and the Amateur Tradition in British Science', *The Journal of Social History*, 1978, *8(2*), pp. 30-50 on p. 34.
[16] Leonard Horner (1785-1864). Scottish-born businessman, educationalist and amateur geologist. F.R.S. 1813. Member of GSL council 1809-10, 1810-14, 1828-32 and 1837-64. GSL President 1845-47 and 1860-62. *DNB* and H.B. Woodward, *The History of the Geological Society of London*, Longmans, Green and Co., London, 1908, pp. 289-291 and 303.

2.1.2 THE REFORM MOVEMENT IN THE 1820s AND 1830s

The changes in social relationships that began in the late eighteenth century, and continued well into the nineteenth century, reflected basic changes throughout English society. In particular, political and economic tensions increased markedly in the 1820s and culminated in the passing of the Reform Act in June 1832 and the consequent introduction of more democratic voting rights. This legislation also eased fears of a political revolution, and was a prelude to a wide range of further reforms.[17]

During this period the recognised need for general reform affected geology in several ways. On an individual level it created a more amenable environment for the recognition and encouragement of able and ambitious men from relatively humble backgrounds, such as Mantell. As Dean has noted, "upward social mobility based upon meritorious accomplishment became significantly commoner thereafter".[18] Scientific institutions also experienced change. The dominant role of the Royal Society of London was questioned. In 1831, the British Association for the Advancement of Science (BAAS) was established.[19] Secord has argued that the establishment of the Geological Survey of Great Britain in the mid-1830s, and its rapid growth and drive for professionalisation in the 1840s, is best understood in the context of a whole series of contemporary reform movements.[20] One of the outcomes of these developments was the creation of new career opportunities. The upper-class, but impoverished De la Beche, was confirmed in his appointment as director of the Geological Survey; Owen, a professional comparative anatomist received a BAAS study-grant to report on fossil reptiles in 1837; John Phillips, who came from a modest background, was employed by both BAAS and the Geological Survey. Each of these men played key roles in the development of English geology in the first half of the

[17] Other measures that arose from the 1832 Reform Act were the 1833 Factory Act, the 1834 Poor Law Amendment Act, the 1835 Municipal Corporations Act and the establishment of the Ecclesiastical Commission in 1836.
[18] D.R. Dean, 'Review of M.J.S. Rudwick, *The Great Devonian Controversy*', *Annals of Science*, 1986, *5*, pp. 504-507 on p. 506.
[19] These points are made by H.S. Torrens, 'Politics and Palaeontology: Richard Owen and the invention of Dinosaurs', in : J.O. Farlow and M.K. Brett-Surman (eds), *The Complete Dinosaur*, Indiana University Press, Indiana, 1997, pp. 175-190 on p. 176-177.
[20] J.A. Secord, 'The Geological Survey of Great Britain as a Research School, 1839-1855', *History of Science*, 1986, *24*, pp. 223-275 on p. 224.

nineteenth century.

The indirect flow-on effects of the Reform Act were a continuing feature of English life during the 1830s and 1840s and constitute significant and pervasive elements throughout this thesis.

2.1.3 ORIGINS OF THE GSL AND THE NATURE AND MOTIVATIONS OF ITS MEMBERS

Since the prosopographic and screening analyses are concerned with detecting changing trends in the composition of members of the GSL council during the first half of the nineteenth century, the relevant literature encompasses the following aspects:

- The motivations of the various interest groups involved in the development of English geology before 1807.
- The role of specialist natural history societies in the late eighteenth and early nineteenth centuries.
- The reasons for the formation of the GSL in 1807 and the nature of its aims and research programmes.
- The motivations and class interests of the founding GSL members.

Most of the relevant literature on the above topics was written during the period 1976 to 1983, when there was a surge of interest by social historians of science in the origins of British scientific societies, and in the social factors associated with their formation. Subsequent literature concerning nineteenth-century geology has tended to focus on more specific geological issues.

(1) ENGLISH GEOLOGY AND SPECIALIST SOCIETIES BEFORE 1807

In his 1977 publication, *The Making of Geology*,[21] Porter gave a largely sociological account of how geology emerged as a separate discipline during the period 1775 to 1815. In brief, he argued that separate, but long-established aspects of geology such as mineralogy, the classification of fossils, and the nature of the earth's strata, were re-constituted into geology

[21] R. Porter, *The Making of Geology: Earth Science in Britain 1660-1815*, Cambridge University

by the early nineteenth century. Porter identified several strands of English society responsible for the effective integration of these different specialties. First, there was an occupational group requiring a better knowledge of the nature of the earth at a time of increasing industrialisation. Men in this 'practical' category included land surveyors, canal builders, and coal prospectors. In the main they were men of humble origins and limited education. Another strand comprised a group of London-based Quakers and dissenters who tended to be occupied in skilled proprietorial enterprises, such as publishing, and chemical and technical manufacturing. Excluded from the political and social mainstream because of their religion, this group "fostered zealous commitment to the progress of utility, wealth, knowledge and talent".[22] The third group identified by Porter comprised leisured and wealthy gentlemen from the upper class, whose motivations were mixed. In some cases the new interest in geology stemmed directly from economic and mining interests. Another suggested motivation was the attraction of a "passionate Romantic engagement" that followed "the Enlightenment ideal of a cosmopolitan stoicism".[23] Conybeare's attitude was cited as an example of this fresh, adventurous spirit:

> I partake more largely of the spirit of the Knight of La Mancha than of his craven squire and prefer the enterprise and adventure of geological errantry to rich castles and luxurious entertainments.[24]

Such romantic sensibilities towards geology fostered travel, which in itself was another attraction of the new discipline for wealthy young men.

Porter's analysis illustrates the heterogeneous nature of the various class groups that practised and promoted geology at the end of the eighteenth century. In fact, he suggested that this diversity in social base, style, and content probably constituted an ideal environment to foster growth of the subject. Nevertheless, Porter assigned a key role to the wealthy land-owners who established an ongoing, gentlemanly amateur tradition and who over-rode the aspirations of the new breed of practical engineers.[25]

Press, Cambridge, 1977.
[22] *Ibid.*, p. 141.
[23] *Ibid.*
[24] W.D. Conybeare in a letter to G.B. Greenough, 18 June 1811 (University of Cambridge Library, Greenough mss); quoted in Porter, *op. cit.* (note 21), p. 141.
[25] Porter, *op. cit.* (note 14), pp. 814-817.

Coincident with the emergence of geology as a new discipline was the growth of several new specialist societies that were wholly or partly concerned with aspects of earth science. One example is The Royal Institution, founded in London in 1799 by a group of utilitarian minded, upper class land-owners, with the goal of "bending science to entrepreneurial and professional purposes".[26] Inkster provided further insights into the nature of specialist London societies in his 1977 analysis of the Askesian Society of London,[27] members of which played a key role in the subsequent formation of the GSL. After noting that many new societies were formed in London after 1790, he suggested that:

> these groupings reflected the social needs of those individuals whose emergence was an integral part of London's changing economic and social structure.[28]

The Askesian Society was one such organisation. It was founded in 1796 and consisted of "a select number of gentlemen, associated for their mutual improvement in the different branches of natural philosophy".[29] However, the membership structure of the society was restricted, since the active core consisted predominantly of a group of Quakers engaged in chemical activities, specialist manufacturing and publishing. The scope of the society's interests focused on chemistry and mineralogy, disciplines pertinent to many of the Quakers' business activities. Inkster concluded that the attraction of science at this time was a direct reflection of its utility, and distinguished three such levels in his analysis of the Askesian Society. First, it was an appropriate form of cultural legitimation for those classes or groups denied their fair share of political and social power.[30] Second, the application of science, and particularly the disciplines of chemistry, mineralology and geology, offered practical utility in the form of commercial improvements and new opportunities. Finally, science opened up new income

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[26] M. Berman, *Social Change and Scientific Organization: The Royal Institution, 1799-1844*, Heinemann, London, 1978, p. 21.
[27] I. Inkster, 'Science and Society in the Metropolis: A Preliminary Examination of the Social and Institutional Context of the Askesian Society of London, 1796-1807', *Annals of Science*, 1977, *34*, pp. 1-32.
[28] *Ibid.*, p. 14.
[29] Statement by A. Tilloch, a member of the Askesian Society in *Philosophical Magazine*, 1800, *7*, on p. 355; quoted in *ibid.*, p. 16.
[30] S. Shapin and A. Thackray made this point in 'Prosopography as a Research Tool in History of

earning opportunities, such as lecturing and writing.

A more specialist group than the Askesian, The British Mineralogical Society (BMS), was founded in 1799 and restricted membership "to such as are able and willing to undertake a chemical analysis of a mineral substance".[31] Members of the BMS comprised middle-class chemists, physicians, and proprietors of businesses subject to technological change, such as iron-makers and instrument manufacturers. The objects of the society were utilitarian and reflected the commercial needs of this particular London-based group at a time of rapid industrialisation.

Weindling[32] followed a similar, but broader-based theme, arguing that the mineral history of Great Britain has been an overlooked, but an important economically orientated factor in the foundation of the GSL. To this end Weindling examined the connection between the foundation of the GSL and a preceding scheme for a national school of mines, backed by two prominent, upper class mineral collectors,[33] that was proposed as an auxiliary establishment to the Royal Institution. Although the scheme foundered, its planned formation supports Weindling's argument that geology was seen as a means of broad social improvement by some members of the upper classes. Members of the Askesian or the BMS were hardly mentioned by Weindling in this study. Five years later, however, Weindling[34] examined the activities and membership of the two societies and rejected Inkster's assessment that members of both the Askesian Society and the BMS were marginal men seeking social legitimisation. He suggested that Inkster had overlooked the established financial base enjoyed by most of the Askesian Quakers. In the case of the BMS, Weindling argued that although occupational concerns explain the members' interest and competence in mineralogy, these members then participated in more general scientific associations. He concluded that science was used by such well established groups to maintain their social

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Science: The British Scientific Community 1700-1900', *History of Science*, 1974, *12*, pp.1-28.

[31] Woodward, *op. cit.* (note 16), p. 7.

[32] P.J. Weindling, 'Geological Controversy and its Historiography: The Prehistory of the Geological Society of London', in L.J. Jordanova & R.S. Porter (eds), *Images of the Earth: Essays in the History of the Environmental Sciences*, The British Society for the History of Science, Chalfont St. Giles, 1978, pp. 248-271.

[33] Sir John St Aubyn Bt., M.P., F.R.S. (1758-1839) and Sir Abraham Hume Bt., F.R.S. (1749-1838). Both were appointed to the GSL council in 1810. Woodward, *op. cit.* (note 16), p. 33.

[34] P.J. Weindling, 'The British Mineralogical Society: a case study in science and social improvement', in: I. Inkster and J. Morrell (eds), *Metropolis and Province: Science in British Culture, 1780 -1850*, Hutchinson, London, 1983, pp. 120-150.

standing by reinforcing established, occupational interests.

A more novel explanation for the surge of interest in geology from 1790 to 1840 was advanced by Shortland in 1994.[35] In exploring this theme, Shortland examined two contrasting contexts: those of Romanticism and mining – within the research domain of cave investigations. He suggested that during this alleged 'Golden Age of geology', the Romantics were not directly concerned with geology; its attraction was that it was a hard, masculine science: "a science for men, by men, about the activities of men".[36] To a limited extent this explanation is supported by Fitton's statement in *The Edinburgh Review*:

> Geology has this great advantage, which not even Botany partakes more largely, – that it leads continually to healthful and active exertion, amidst the grandest and most animating scenery of Nature, – and that, demanding indispensably, the combination of labour, and the interchange of acquirements, it gives rise to a frankness and warmness of communication amongst its cultivators, which renders the collateral results of friendship and association some of the most delightful of its fruits.[37]

However, Shortland's evidence for extolling the masculine attractions of geology is not compelling. Active and companionable field-work can well be regarded as a pleasurable consequence of geological investigations, rather than its primary initial attraction.

The main conclusion that can be drawn from the relevant literature is that the upsurge in interest in geology in the late eighteenth and early nineteenth centuries occurred in a wide range of social groups for diverse reasons. The various motivations of groups within the upper class included personal economic benefit, increased social utility of the nation, the attractions of combining travel with a new spirit of romantic engagement with nature, and finally, intellectual curiosity. Middle class motivations were also varied. Besides encompassing the above factors, their motives also included social legitimation and advancement, enhancing occupational prospects, and using mineralogical developments, in particular, as a means of maintaining their

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[35] M. Shortland, 'Darkness Visible: Underground Culture in the Golden Age of Geology', *History of Science*, 1994, *32*, pp. 1-61.
[36] *Ibid.*, p. 5.
[37] W.H. Fitton, 'Art. IV. *Transactions of the Geological Society,* established November 1807. Vol. III. 4 to., pp. 444, W. Phillips, London, 1816', *The Edinburgh Review or Critical Journal*, 1818, *29*, p. 74.

social and economic interests.

There has been no one study that has assessed the overall relative importance of these various explanations. Indeed, such an analysis would encounter several difficulties. First, the relative significance of each of the identified factors changed with time, and changes were especially frequent during this period of reform and industrial growth. Furthermore, a particular mix of motivations can only effectively apply to a specific entity or organisation and not to a heterogeneous mix of individuals, societies, and institutions situated in different counties, towns, and cities.

(2) THE ORIGINS, AIMS AND FOUNDING MEMBERS OF THE GSL

The activities of the BMS essentially petered out by 1804 and it was incorporated into the Askesian Society in December 1806. The next step was the founding of the GSL by eleven of its thirteen original members at a dinner at the Freemason's Tavern on 13 November 1807.[38] Additionally, the group decided that they would dine together monthly, from November to June inclusive, at the not inconsequential cost of fifteen shillings per head. At its inception, therefore, the GSL was conceived as a specialist-interest, dining club.

Woodward's centennial history of the GSL does not probe the motivations and aspirations of the various groups involved in the formation of the GSL, but one of the book's strengths is that it contains data on the backgrounds of early members. One of the features to emerge from Woodward's descriptions of the thirteen original members of the GSL is their heterogeneity. Eight of the thirteen were ex-Askesians, four of whom were Quakers. The twenty-nine-year-old Greenough was the only original member who could be described as an independent gentleman, but he was also a Unitarian whose fortune was derived from patent medicines. Besides Greenough, the occupational categories of the founding group comprised four physicians, five chemists, a French emigré mineralogist, an instrument-maker, and a publisher.

On 1 January 1808 the following statement concerning the Society's objects was promulgated:

> This Society is instituted for the purpose of making geologists acquainted with each other, of stimulating their zeal, of inducing them to adopt one nomenclature, of facilitating the communication of new facts, and of contributing to the advancement of Geological Science, more particularly as connected with the Mineral History of the British Isles.[39]

The first council of the Society, as distinct from the previous committees, was formed on 14 June, 1810,[40] and the heterogeneous nature of its membership is illustrated below.

[38] Woodward, *op. cit.* (note 16), pp. 9-18.
[39] Woodward, *op. cit.* (note 16), pp. 18-19.
[40] *Ibid.*, p. 33.

TABLE 2.1 - SOCIAL COMPOSITION OF THE FIRST GSL COUNCIL

(Ex-members of the Askesian Society are marked *)

OCCUPATIONAL CATEGORY	NUMBER	MEMBERS OF COUNCIL
Wealthy landed gentry	3	Sir John St. Aubyn, Sir Abraham Hume, R. Ferguson
Independent 'gentleman-amateurs'	3	G.B. Greenough, R. Chenevix, J.G. Children[41]
Physicians	5	W. Babington*, J. Laird, J. Macculloch, A. Marcet, P.M. Roget.
London based chemists, business proprietors	7	A. Aikin*, W. Lowry*, W.H. Pepys*, R. Phillips* W. Phillips*, S. Woods*, L. Horner.
Various	4	J.L. Count de Bournon*, S. Davis, M. Raine, D. Ricardo

In 1963, Rudwick[42] re-examined and amplified several important events in the early history of the GSL, using Greenough's papers that had been unavailable to Woodward. Rudwick's analysis highlights the key role that the Society's first president, Greenough, played in 1808-09, when he was largely instrumental in shaping the GSL's future research programme, and in ensuring its independence from the Royal Society of London. In 1808, Greenough and Aikin were mainly responsible for preparing and distributing to all members, including the more numerous honorary members, a small

[41] Children was the son of a wealthy Tonbridge banker who became bankrupt in 1816, which necessitated his obtaining employment after that date. *DNB*.

[42] M.J.S. Rudwick, 'The Foundation of the Geological Society of London: Its Scheme for Co operative Research and Its Struggle for Independence', *The British Journal for the History of Science*, 1963, *4(1)*, pp. 325-355.

booklet entitled *Geological Inquiries* that contained a series of questions relating to the more essential points of geology. Of particular importance is the following sentence from its introduction:

> The knowledge of the general and grand arrangements of nature must be collected from a number of particular and minute instances, and on this ground the slightest information relating to the structure of the earth is to be regarded as of some importance.[43]

As Rudwick noted: "This 'Baconian' view of the nature of geology was fundamental to the Society's plan for launching an ambitious scheme for co-operative research".[44] In short, Greenough's Baconian policy was promulgated in the 1810s, together with the necessary, accompanying objectives of enlarging the Society's membership and ensuring independence from the Royal Society of London. The GSL was no longer a dining club, though a GSL dining group was re-constituted in 1824.[45]

The view that the methodological stance of the GSL was strongly, if not radically, empirical during the 1810s was further supported by Rachel Laudan in 1977[46] when she argued that Greenough's 'Baconian' research programme, with its atheoretical and outmoded methodology, impeded the progress of English geology. However, in a subsequent analysis of the method discourse associated with the early years of the GSL, Miller[47] has pointed out that the GSL was not so rigidly anti-theoretical and single-minded in its methodology as sometimes supposed. In fact, Miller concluded that during the 1810s there was no uniformity of method, but rather continuing struggles between various sub-groups, such as the Wernerian and Cuvierian stratigraphers, and those primarily interested in geology as a search for knowledge of the earth, and those with a narrower and utilitarian focus. Each of these sub-groups tried to establish their skills as being the most appropriate basis for geological investigations.

The literature pertaining to the origins of the GSL thus highlights two

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[43] *Ibid.*, p. 334.
[44] *Ibid.*, pp. 334-335.
[45] Woodward, *op. cit.* (note 16), p. 65.
[46] R. Laudan, 'Ideas and Organizations in British Geology: A Case Study in Institutional History', *Isis*, 1977, *68*, pp. 527-538.
[47] D.P. Miller, 'Method and the "Micropolitics" of Science: The Early Years of the Geological and Astronomical Societies of London', in: J.A. Schuster and R.R. Yeo (eds), *The Politics and Rhetoric*

aspects germane to this thesis. First, the mix of early council members reflected the varied motivations and aspirations of those participating in English geology during the first two decades of the nineteenth century. Second, a fixed research programme for the Society had not been achieved by the late 1810s, when Lyell and Mantell became members. Both men joined the Society when there was considerable scope for further change.

2.1.4 THE CONCEPTS OF THE 'GENTLEMAN-AMATEUR', 'GENTLEMAN-GEOLOGIST', 'GENTLEMEN OF SCIENCE' AND 'GENTLEMAN-SPECIALIST'.

These four inter-related terms have been used frequently by historians of science to describe a particular stratum of upper-class English society involved in specialist societies during the first half of the nineteenth century. This stratum or group is of particular relevance, since it came to assume a dominant role in the activities of the GSL after 1830.

Reference has been made to Porter's[48] identification of the important role that wealthy land-owners played in establishing a gentlemanly, amateur tradition in regard to geology in the late eighteenth century. Such men "embraced geology as an enriching avocation",[49] and their interest in the subject was pursued in a liberal, gentlemanly manner.

Morrell and Thackray adapted and broadened the concepts of the 'gentleman-amateur' and the 'gentleman-geologist' in their 1981 study, *Gentlemen of Science: Early Years of the British Association for the Advancement of Science*,[50] in which they used the term 'Gentlemen of Science' to describe the coterie of men who effectively controlled the Association in the 1830s. This group, which shared many common features and membership with the 'gentleman-geologists', was described by Morrell and Thackray in the following terms:

> The group, our Gentlemen of Science, consisted primarily of liberal Anglicans who possessed secure status, income and property. Their familiar haunts were in metropolitan and academic

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of Scientific Method: Historical Studies, D. Reidel Publishing Co., Holland, 1986, pp. 227-258.
[48] Porter, *op. cit.* (note 14), pp. 814-819.
[49] Porter, *op. cit.* (note 14), p. 818.
[50] J. Morrell and A. Thackray, *Gentlemen of Science: Early Years of the British Association for the Advancement of Science*, Clarendon Press, Oxford, 1981.

> centres. The Gentlemen of Science had predominant interests in geology and the physical sciences, and in an intellectual definition of vocation and calling. Their concerns lay not with professional advancement in any narrow, financial sense, but rather with a religious and moral vision. To pursue knowledge of God's created order in a rigorous and disciplined way was a proper calling for gentlemen in an age of evangelical seriousness.[51]

The concept was further adapted by Rudwick,[52] in 1982, when he referred to the active members of the major London specialist societies during the 1830s as 'gentleman-specialists'. Rudwick's adaptation of the term is used in this thesis instead of 'gentleman-geologists', because it incorporates such GSL members of council as Whewell and Herschel,[53] whose scientific interests extended well beyond geology. In fact, this thesis uses a further variation of the term. In order to distinguish between members of the clergy who were active GSL councillors, such as Buckland and Sedgwick, from those who exhibited an essentially minor interest in geology, the companion term 'clergyman-specialist' has been adopted. This modified term has been chosen in preference to the alternative of 'academic-specialist' for this small but influential sub-group, since their teaching and academic roles were a consequence of their position in the Established Church.

A further point is that the prosopographic and screening analyses illustrate the growth in numbers of the 'gentleman-specialist', besides indicating when this group emerged as a dominant force in the affairs of the GSL.

2.1.5 PROFESSIONALISATION OF ENGLISH GEOLOGY

The emergence of a dominant group of 'gentleman-specialists' after 1830, can be regarded as a significant, but paradoxical stage in the professionalisation of English geology. Both Porter[54] and Secord[55] point out that the 'gentleman-specialists', as typified by Greenough, Fitton, Lyell, and Murchison, pursued

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[51] *Ibid*., p. 101.
[52] M.J.S. Rudwick, 'Charles Darwin in London: The Integration of Public and Private Science', *Isis*, 1982, *73*, pp. 186-206 on p. 189, note 10.
[53] J.F.W. Herschel (1792-1871). Eminent astronomer and son of Sir William Herschel. GSL member of council 1827-29 and 1831-32. *DNB* and Woodward, *op. cit.* (note 16), p. 302.
[54] Porter, *op. cit.* (note 14), p. 825.
[55] J.A. Secord, *Controversy in Victorian Geology: The Cambrian-Silurian Dispute*, Princeton University Press, Princeton, 1986, p. 204.

their chosen career in geology on a virtual full-time vocational basis, but without the emoluments of a paid profession. In doing so, they maintained their gentlemanly independence and many of the aspects of the earlier, amateur ethos. Nevertheless, the zealousness and single-mindedness that they exhibited in pursuing their geological activities, plus their high level of technical competence, are characteristics of successful professional practitioners. In this context it is worth noting Porter's comment that the pejorative term 'amateur' dates only from the 1860s,[56] when the professionalisation of geology had advanced to a further stage in its development.

Both Lyell and Mantell commenced their geological activities in what can be described as the last phase of the amateur tradition, and just before the advent of the dominant 'gentleman-specialists'. This latter stage encompassed the most consequential years of their geological careers, although their later years also incorporated the arrival of the professional geologist. Consequently, it is necessary to recognise the various stages of professionalisation that geology underwent during the first half of the nineteenth century, in order to gain a better understanding of the careers of both Lyell and Mantell, as well as the changing nature of the GSL council.

In a recent doctoral dissertation, Moser has reviewed the literature concerning theories of professionalisation that have been developed in sociology, political science, and more recently, in the history of science. She defined the process in this way:

> Professionalisation is a dynamic social process involving the production and sanction of disciplinary knowledge. It refers to the construction of disciplinary boundaries, the delineation of certain norms or modes of practice and behaviour, and the creation of a sense of professional identity. Professionalisation also refers to the social process of constructing an institutional infrastructure which serves to shape the production of disciplinary knowledge. Above all, however, it is a highly selective and exclusionary process, which involves demarcating who is and who is not entitled to be a member of the professional group. It is this 'gatekeeping' aspect of professionalisation that is fundamental to the formation of disciplinary cultures.[57]

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[56] Porter, *op. cit.* (note 14), p. 822.
[57] S. Moser, 'Archaeology and its Disciplinary Culture: The Professionalisation of Australian Prehistoric Archaeology', unpublished Ph.D. thesis, University of Sydney, 1995, p. 34.

Moser concluded that professionalisation is characterised by various phases, within which certain strategies are undertaken to define the field. These phases can be summarised as follows:

- The first phase is concerned with constructing the foundational knowledge. Strategies revolve around establishing a cognitive identity for the subject and calls for standardisation of terms and concepts.
- In the next phase methodologies are delineated and research strategies outlined.
- The third phase of professionalisation revolves around the creation of an institutional or structural base for the subject.
- In the final phase a disciplinary culture is created. It is here that the distinctive qualities associated with the practice of the subject are defined and a mechanism established for binding the professional community together.

Moser also pointed out that the various phases of the professionalisation process can proceed concurrently. More pertinently, in the case of English geology a case can be made that there has been more than one cycle in the overall professionalisation process.

The first such cycle commenced with the crystallisation of geology as a separate discipline during the period 1780 to 1800. The second phase, involving the delineation of methodologies and the advocacy of various research programmes, effectively took place during the period 1810 to 1820. The GSL provided the required institutional base, supplemented to some extent by Sedgwick's and Buckland's lectures at Cambridge and Oxford. The formation of a bonding, disciplinary culture was also developed and fostered during these years through such means as geological dinners and field excursions. The final phase of the professionalisation process involves the creation of a disciplinary culture of which a key aspect is social closure and exclusion or, more bluntly, 'gatekeeping'. In the early years of the GSL, exclusion was essentially based on social factors, such as gentlemanly status. Geological competence then became an increasingly important factor in the exclusion process, as an inner coterie of geologists decided who could arbitrate and participate in the fashioning of geological knowledge. In essence, a small number of 'gentleman-specialists' fulfilled this role after

1830, thus completing the first cycle of the professionalisation process.

The next cycle was largely dominated by the emergence and growth of the Geological Survey of Great Britain, which provided opportunities for the full-time employment of geologists. In this regard Secord raised a relevant point in his 1986 paper, 'The Geological Survey of Great Britain as a Research School, 1839-1855',[58] where he persuasively argued that De la Beche

the first Director of the Survey, was intent on creating a new research school in geology based on palaeoecology. This illustrates and ties in with the characteristics of the second phase of the professionalisation cycle, the delineation of new methodologies and research programmes. During the second half of the nineteenth century frictions naturally developed between the 'professional' surveyors and the 'gentleman-specialists', a factor Oldroyd noted in *The Highlands Controversy*.[59] Oldroyd also makes the point that coincident with these increasing tensions, geological work was dividing into specialties of ever increasing narrowness.[60] This was another significant factor in the second cycle of the professionalisation of geology. But, as O'Connor and Meadows[61] have pointed out, there was no absolutely clear differentiation between professional and amateur in British geology until after the Second World War.

An opportunity exists for further work to be done in analysing and fleshing out the details concerning the second cycle of the professionalisation process in English geology, and also to investigate whether other disciplines have undergone two such cycles.

2.1.6 THE EMERGENCE AND NATURE OF AN ENGLISH GEOLOGICAL ELITE

In his article 'Gentlemen and Geology: The Emergence of a Scientific Career, 1660-1920', Porter used the term 'elite' to describe the coterie of 'gentleman-geologists' who exercised control over British geology because they came "to dominate its institutions and judge standards of work

[58] Secord, *op. cit.* (note 20).
[59] D.R. Oldroyd, *The Highlands Controversy: Constructing Geological Knowledge through Fieldwork in Nineteenth-Century Britain*, The University of Chicago Press, Chicago, 1990, p. 9.
[60] *Ibid.*, p. 15.
[61] J.G. O'Connor and A.J. Meadows, 'Specialization and Professionalization in British Geology',

competence".[62] This point was also made by Morrell,[63] when he referred to the domination of the GSL by an oligarchy of gentlemen of secure income, but based on merit and not rank. In this context Morrell named Lyell, Murchison, Broderip,[64] Fitton, Greenough, and Darwin, aided by the 'clergyman-specialists' Sedgwick, Buckland, and Whewell. Secord also referred to the same list of leading GSL members (with the exception of Broderip), stating that they constituted "an urban social and scientific elite"[65] during the 1830s and 1840s. Another author to use the term 'elite' was Heyck, in 1982, when he observed that an elite based on technical merit dominated the London-based Geological, Astronomical, Zoological and Chemical Societies.[66]

There are no references in the literature to an English geological elite, as distinct from a social elite engaged in geology, before the late 1820s, and one of the aims of this thesis is to show how and when such a group arose. The only contemporary use of the term 'elite' that has been identified by the author was by John Phillips in a letter to Charles Babbage, dated 7 June 1837, in which he explained that the General Committee BAAS had to be restricted to "the elite of our corps scientifique".[67]

In the previous section dealing with the professionalisation of English geology, mention was made of an inner coterie of geologists who discharged the critical function of 'gatekeeping' in the final phase of the professionalisation cycle. In a 1982 paper,[68] and later in *The Great Devonian Controversy*,[69] Rudwick made a significant contribution to understanding the nature of this group. In developing his definition of a geological elite Rudwick introduced the concept of gradients of attributed geological competence. Porter's earlier description of a geological elite, although power orientated, was essentially based on social status. Rudwick brought in the necessary ingredient of technical meritocracy:

Social Studies of Science, 1976, *6*, pp. 77-89.
[62] Porter, *op. cit.* (note 14), p. 821.
[63] J.B. Morrell, 'London Institutions and Lyell's Career: 1820-41', *The British Journal for the History of Science*, 1976, *32*, pp. 132-146 on p. 139.
[64] William John Broderip (1789-1859). Lawyer and naturalist. Magistrate at Thames police-court, 1822-1846. GSL member of council 1826-38 and 1855-57. *DNB*.
[65] Secord, *op. cit.* (note 55), pp. 19-20.
[66] T.W. Heyck, *The Transformation of Intellectual Life in Victorian England*, Croom Helm Ltd., London, 1982, p. 59.
[67] Quoted in a footnote by Morrell and Thackray, *op. cit.* (note 50), p. 304.
[68] Rudwick, *op. cit.* (note 52), pp. 190-194.
[69] M.J.S. Rudwick, *The Great Devonian Devonian Controversy: The Shaping of Scientific Knowledge among Gentlemanly Specialists*, University of Chicago Press, Chicago, 1985, on pp. 29

> Scientific status was primarily expressed in terms of the competence of any individual geologist to deliver reliable information or ideas of specific kinds…it was attributed to the individual at the time, by himself and by others.[70]

Differences in competence were sorted out along a tacit gradient and might be regarded as akin to changing vegetation zones on a mountainside. Rudwick classified the different levels of competencies into three broad groups: the amateurs at the bottom, rising to the accomplished in the middle zones, and with the elite group at the top. The characteristics of those at the peak were described as follows:

> They were men with a strong, indeed primary, commitment to geology rather than any other branch of science. They were highly active in the affairs of its institutions and in practical fieldwork, and usually highly productive in publication. They interacted intensely with each other, whether in cooperation or in rivalry and antagonism. Above all they regarded themselves, and were generally regarded by others, as competent arbiters of the most fundamental matters of both theory and method within the science.[71]

In amplifying his ideas on geological competence, Rudwick explained the concept in terms of regionality. The geological competence of the amateurs is essentially confined to their local area. Although the expertise of the accomplished group is much broader, it still tends to be somewhat restricted and specialised, for example, confined to fossil fish from the Scottish Devonian, or focused on a particular geographic region or group of strata. On the other hand, the competence of the elite is international in scope, and hence ‘transportable’ by nature. Another aspect of Rudwick’s concept is that the attributed grades of geological competence are never static; at any one time able and younger geologists can move into the zone of the elite because of the acknowledged quality of their work, whilst older and less active members may be on their way out. During the 1830s, for example, Rudwick included Sedgwick, Murchison, De la Beche, Greenough, Buckland, Lyell and Whewell as members of the elite, noted that Phillips and Darwin were

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and 418-428.
[70] *Ibid.*, p. 419.
[71] *Ibid.*, p. 420.

approaching this inner circle and that Conybeare was slipping from it.

A final and important feature of Rudwick's concept concerns the location and nature of a 'core-set' in relation to any particular major theoretical problem. The concept of the 'core-set' in modern science has been proposed by Collins,[72] and relates to those scientists actively involved in a particular experimental controversy and whose decision decides its outcome. In Rudwick's assessment, the 'core-set' in a specific geological controversy can be identified by superimposing zones, indicating the relative involvement of individuals in the controversy, over the zones of attributed competence. The resulting common area delineates the 'core-set'.

Dean, who has done considerable work on the life and work of Mantell, disagreed with some aspects of Rudwick's concept in his review[73] of *The Great Devonian Controversy*. In particular, Dean questioned whether outsiders strove incessantly to become members of the inner elite circle, and also whether Rudwick fully considered the impact of Reform pressures on elitism generally. However, Dean's comments essentially relate to social mobility and the position of Mantell, whom Dean believed had been cursorily treated by Rudwick.[74]

Although Rudwick's work on the nature of the geological elite in the nineteenth century provides an excellent base, there are some minor gaps and uncertainties. First, Rudwick essentially restricted his explanatory concept of ascribed degrees of competence to the 'gentleman-specialists', and effectively ignored talented and highly competent outsiders, such as Anning[75] and Smith.[76] In fact, the notion can be applied to several geological sub-groups, such as fossil collectors and identifiers, and the socially inferior, 'practical' men of geology.[77] Additionally, Rudwick's classifications of the various geologists into elite, accomplished and amateur categories are essentially qualitative value judgments, based on the nature of their work and the degree

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[72] H.M. Collins, 'The Place of the "Core-Set" in Modern Science: Social Contingency with Methodological Propriety in Science', *History of Science*, 1981, *19*, pp. 6-19.
[73] D.R. Dean, *op. cit.* (note 18), pp. 504-507.
[74] *Ibid.*, p. 506, note 2.
[75] Mary Anning (1799-1847). Fossil collector and dealer of Lyme Regis. *DNB*.
[76] William Smith (1769-1839). Canal surveyor and geologist. *DNB*.
[77] This point was kindly brought to the author's attention by H.S. Torrens in an informal communication dated 5 October 1997. Furthermore, M.A. Taylor and H.S. Torrens raised the question of where figures such as Anning, in her role as a professional working class female collector of fossils would be located in any map of ascribed competence in their joint paper, 'Saleswoman to a New Science: Mary Anning and the Fossil Fish *Squaloraja*, from the Lias of Lyme Regis', *Proceedings of the Dorset Natural History and Archaeological Society*, 1987, *108*, pp. 135-148 on p. 135.

of respect and deference that they bestowed on each other in their geological correspondence. Here an attempt is made to obtain the same results using different and more objective techniques. Finally, Rudwick's analysis of the English geological elite is necessarily focused on the time frame of the 'Great Devonian Controversy'. By contrast, the analysis carried out in this thesis covers the first half of the nineteenth century on a decade-by-decade basis, with the aim of indicating when an identified elite emerged, and the extent of any changes in its composition.

2.1.7 PROSOPOGRAPHIC ANALYSES

Stone has defined prosopography as "the investigation of the common background characteristics of a group of actors in history by means of a collective study of their lives".[78] His paper also outlined the advantages and limitations of prosopographic research in historical work generally. Three years later, in 1974, the particular advantage of using prosopography in the history of science was highlighted by Shapin and Thackray[79] – its application helps to minimise the problem of studying historical figures with present day perspectives. The authors further argued that the technique is especially applicable to studies of British science during the period 1760 to 1850, when developments such as rapid industrialisation, urbanization, religious dissent, increased social mobility, and the formation of new specialist societies led to a more broadly based, and pluralistic, scientific community.

As a suggested starting point for future prosopographic analyses of the British scientific community, the two authors subdivided this broad grouping into three categories, based on levels of involvement. On the first level are those who have published a paper on natural history; a second level comprises those who have not published, but were active in the affairs of a particular scientific community; and finally, in a third and outer category, are the cultivators and patronisers.

Thackray focused on the latter two categories in a prosopographic analysis of the 588 members of the Manchester Literary and Philosophical Society who joined this Society from its inception in 1781, until 1852.[80]

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[78] L. Stone, 'Prosopography', *Daedalus*, 1971, *100,* pp. 46-79 on p. 46.
[79] Shapin and Thackray, *op. cit.* (note 30), pp. 1-28.
[80] A. Thackray, 'Natural Knowledge in Cultural Context: The Manchester Model', *The American*

Groups of new members were adjusted to a comparable size by varying the interval of their joining dates, and the key social characteristics analysed were religion, occupation and social status. This selection enabled membership trends, such as an increase in the relative number of manufacturers and a decline in the percentage of Unitarians, to be highlighted for comment and study. The results supported Thackray's finding that:

> An adequate understanding of the society hinges on the question of the social legitimation of marginal men, on the adoption of science as the mode of cultural self-expression by a new social class, and on generational patterning in intellectual life.[81]

A feature of Thackray's Manchester study is that it broke away from the earlier prosopographic analyses that tended to focus on social and scientific elites, such as early members of the Royal Society of London.[82] Shapin[83] also used prosopographic analysis effectively to demonstrate the marked differences in occupational status between members of the Edinburgh Phrenological Society and the Fellows of the Royal Society of Edinburgh, in connection with his sociological analysis of the conflict between phrenologists and their opponents in the 1820s.

An overall review of the use of prosopography in the history of science, including the two papers just discussed, has been carried out by Pyenson.[84] One of his conclusions was that the 'little men' of science have been ignored by historians of science, and that "to study the ideology of science as a cultural system we need especially to consider the ordinary scientist".[85] In making this point he also advocated that such studies should be based on prosopographic techniques. However, in the subsequent 20 years prosopography has tended to be used to highlight particular characteristics of specific groups, rather than provide the basis of a major study in its own right. For example, in Morrell and Thackray's *Gentlemen of Science*,

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Historical Review, 1974, *79*, pp. 672-709.
[81] *Ibid.*, p. 678.
[82] H. Kragh, *An Introduction to the Historiography of Science*, Cambridge University Press, Cambridge, 1987, p. 178.
[83] S. Shapin, 'Phrenological Knowledge and the Social Structure of Early Nineteenth-Century Edinburgh', *Annals of Science*, 1975, *32*, pp. 219-243.
[84] L. Pyenson, ' "Who the Guys Were": Prosopography in the History of Science', *History of Science*, 1977, *15*, pp. 155-188.

prosopography was used in the first chapter to emphasize the common educational, ecclesiastical, and political characteristics of the twenty or so 'Gentlemen of Science' who comprised the inner core of the BAAS during the 1830s and 1840s.[86] In this case, prosopography was not used to identify the members of this inner core, but to highlight the close-knit nature of a scientific clerisy.

In a different context Berman[87] examined the governors of the Royal Institution to show how and when members of the professional middle class came to power in place of the landed aristocracy. Weindling analysed the founding members of the British Mineralogical Society and the Askesian Society,[88] in order to give a profile of the occupational status of members of the former society, and to highlight the dominance of Quakers in the Askesian.

Of more recent relevance, Rudwick[89] used the results of a prosopographic analysis of the 644 non-foreign members of the Geological Society of London in 1835 to illustrate the life and times of Adam Sedgwick. Since the sample is large, Rudwick's analysis gave an excellent, broad picture of the membership of the society at that time; for example, 25% were Fellows of the Royal Society, 6% members of the aristocracy, 5% M.'sP., 13% clergymen, 6% academics and 52% lived outside London. However, these data have limited usefulness, since they pertain only to a specific year, and therefore cannot indicate trends. Moreover, the nature of the sample warrants comment. In Rudwick's case the prosopographic analysis was based on all non-foreign members, most of whom would have belonged to Shapin and Thackray's outer category of 'cultivators and patronisers'.[90] The characteristics of this group were not necessarily common to those of Sedgwick's peers and colleagues on the GSL council, nor to the small group carrying out the more significant geological investigations of the day. No prosopographic analysis has been carried out that explores the changing nature of these two groups in the English geological community during the first half of the nineteenth century.

Although the prosopographic and screening analyses in this chapter do

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[85] *Ibid.*, p. 179.
[86] Morrell and Thackray, *op. cit.* (note 50), pp. 23-24.
[87] M. Berman, *op. cit.* (note 26).
[88] Weindling, *op. cit.* (note 34), pp. 138-143.
[89] M.J.S. Rudwick, 'A Year in the Life of Adam Sedgwick and company, geologists', *Archives of Natural History*, 1988, *15*, pp. 243-268.
[90] Shapin and Thackray, *op. cit.* (note 30), p.13.

not examine the changing pattern of all members of the GSL in the first half of the nineteenth century, they do investigate the changing nature of the GSL members of council in terms of their social and occupational status, as well as their geological contributions. Furthermore, by juxtaposing both institutional power and geological achievement criteria over ten-year time periods, the analyses indicate when significant changes occurred, as well as providing a logical basis for identifying an emergent geological elite.

2.2 METHODOLOGY

2.2.1 TIME-SPAN AND SCOPE OF ANALYSES

The time-span selected for the prosopographic and screening analyses of GSL members of council is 1807 to 1850. This period begins with the founding of the Society in November, 1807,[91] and concludes two years before Mantell's death in 1852. In order to detect changing trends, these formative years in the development of English geology have been divided into four periods, the first of which is 1807 to 1820, followed by the three succeeding decades.

The starting point for these investigations has been restricted to those members who served on the GSL council or committee[92] for a minimum term of one year. To a large extent those excluded comprise Shapin and Thackray's outer circle of 'cultivators and patronisers',[93] and hence fall outside the scope of this analysis. Nevertheless, a later section of this chapter (2.3.5) examines the situation of those GSL members who had not been elected to the Society's council before 1850, but who still made a substantial contribution to English geology. The only significant exception was John Phillips, who was elected to the GSL council in 1853.[94]

Following the granting of a Royal Charter to the Society in 1825, one fifth or more of the GSL council were removed annually by ballot[95] or resignation. In practice, this meant that five new members were elected each

[91] Woodward, *op. cit.* (note 16), p. 10.
[92] Until June 1810 the Society was governed by a committee, three members of which (W. Allen, Sir H. Davy, and the Rt. Hon. C.F. Greville) were not elected to the new council. *Ibid.*, on p. 10 and pp. 28-33. For the sake of completeness these three early committeemen have been included in the analyses.
[93] Shapin and Thackray, *op. cit.* (note 30), p. 13.
[94] Woodward, *op. cit.* (note 16), p. 305.

year to a 23 member council. The number of members of council analysed in each of the four periods is set out in the following table.

Decade	1807-1820	1820-1830	1830-1840	1840-1850[96]
Number of GSL members of council	61	71	60	58

Although the above figures total 250, the number of individual members elected to the council was only 169 in the years to 1850. A significant number served on the council over a period encompassing two or even three decades. No maximum period is specified in the Society's Charter.

In 1815, and in 1845, the number of ordinary GSL members was 240 and 810 respectively.[97] Consequently, the percentage of members of council in the ordinary membership during these years was 25·4% and 7·2% respectively. Although the latter figure, in particular, represents a relatively small percentage of the Society's overall membership, this is not considered a problem, since the analyses are concerned with trends in councillors, not ordinary members, and all members of council are included in the study.

2.2.2 FACTORS ANALYSED

In the prosopographic and screening analyses, the 169 members of council are classified against a background of factors relating to three different kinds of status stratification; namely, social, institutional power, and contemporary geological achievement. The particular factors examined in each of these three categories are now discussed.

(1) SOCIAL STATUS

[95] *Ibid.*, pp. 265-266.
[96] Elections were held on the third Friday in February, marking the end of each year and decade.
[97] Honorary and foreign members, as well as personages of royal blood are excluded from these total Total membership was 341 in 1815 and 883 in 1845. Woodward, *op. cit.* (note 16), p. 51 and *QJGSL*, 1845,

The application of prosopographic and screening techniques to an investigation of the trends and patterns relating to the social status of GSL members of council presented two initial problems. First, some difficulties were encountered in obtaining sufficient, relevant data on each of the 169 members of council. Adequate data were obtained for 93·5%.[98] None of the 11 members of council, for whom insufficient data were procured, had the required achievement levels to be considered in any of the screening analyses.

The second difficulty relates to the nature and number of social status stratifications required for the analysis. As noted in the literature review, it was decided that social status stratifications within each of the English upper and middle classes would provide the most suitable basis of social differentiation. However, the number of possible stratifications within each of these two classes is virtually unlimited, since the various status judgments comprise a vertical continuum. Moreover, no applicable and relevant stratifications were found in the literature. Accordingly, all members of council are classified initially into an upper or middle class group, termed Categories 1 and 2 respectively. There was no need for any lower status, Category 3. Each of these two class categories is then sub-divided into three status stratifications considered pertinent to the period. Specific guidelines concerning the six social stratifications adopted are described below.

CATEGORY 1 – MEMBERS OF COUNCIL

As a general guideline, all members of council in Category 1 would have been recognised as having the status of a gentleman during the first half of the nineteenth century.

Sub Category U1 – Guideline Criteria

- Members of the aristocracy and well established gentry.
- High, independent income, generally exceeding £3000.

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[98] Sufficient personal details were not obtained for 11 of the 169 members of council, namely: W. Apsley, A.K. Barclay, S. Davis, T.C. Harrison, A. Jaffray, F. Moysey, T. Murdoch, A. Robe, E.W. Rundell, T. Smith, and J. Vine. Only T. Smith and J. Vine published (one paper each). T. Smith and T. Murdoch were the only members who were Fellows of the Royal Society at the time of their election to the GSL council.

- Country seat and London base.
- Examples: Sir Philip Egerton, Lord Compton, Davies Gilbert.

Sub Category U2 – Guideline Criteria

- Parents belonged to the 'minor gentry' or were established as leaders in one of the recognised professions.
- Educated at Oxford, Cambridge, or a Military Academy.
- Occupations mainly limited to the Established Church, Law, Army, Diplomacy and Medicine.
- Generally financially independent. Annual income range: £500-5000.
- Examples: C. Lyell, R.I. Murchison.

Sub Category U3 – Guideline Criteria

- Parents were typically members of the clergy, qualified physicians, or substantial business proprietors.
- Occupations include leading London physician (educated at Edinburgh); major business proprietor (Oxbridge education).
- Includes Oxbridge academics and Established Church clerics with annual income £150-250. Otherwise the income range is similar to the U2 sub-category.
- Examples: H. Warburton, Sir A. Crichton, A. Sedgwick (until the mid-1830s).

CATEGORY 2 – MEMBERS OF COUNCIL

This category comprises stratifications within a recently established and growing middle class.

Sub Category M1 – Guideline Criteria

- Parents commonly medium-sized business proprietors.
- Members of the Established Church.
- Occupations include Law and Medicine (but not Oxbridge educated); army surveyors; London-based professors.
- Annual income: £ 250-2000.
- Examples: W. Babington, Professor T. Bell, J. Bostock.

Sub Category M2 – Guideline Criteria

- Quaker or Unitarian business proprietors.
- Non-university educated medical practitioners.
- Income dependent on personal efforts with typical range £200-500, but more in the case of some Quakers.
- Examples: A. Aikin, W.H. Pepys and G.A. Mantell (pre mid-1820s).

Sub Category M3 - Guideline Criteria

- Modest family background and circumstances.
- Income usually in the range £150-250.
- Occupations include draughtsman, museum curator.
- Examples: J. Lindley, T. Webster.

(2) OCCUPATIONAL STATUS

In addition to the above six status stratifications, changes in the occupational status of the councillors are also analysed on a decade by decade basis using the broad occupational and social classifications set down below.

OCCUPATIONAL CATEGORY	DESCRIPTIVE CRITERIA
Independent Gentleman	Acknowledged upper status back-ground. Financially independent. Examples: Sir Philip Egerton, Davies Gilbert.
Gentleman-specialist and Clergyman-specialist	Category 1 members of council who were predominantly engaged in geological or other specialist society activities whilst still maintaining gentlemanly status, and in the case of members of the clergy, also fulfilled their clerical responsibilities. Examples: C. Lyell R.I.M. Murchison, Rev. A. Sedgwick, and Rev. W.D. Conybeare.
Recognised	Established Church, Army, Medicine, Law. Examples: W. Babington,

Professions	R. Bright, Rev. J. Randolph
Business proprietors	Income derived from proprietorial interests in banking, trade, or manufacturing. Examples: J. Taylor, W.H. Pepys.
Full-time salaried positions connected with natural history	Museum Curator, Librarian, London lecturer Examples: W. Clift, T. Webster.

(3) LONDON vs PROVINCIAL BASE

Another relevant factor connected with social status is provincialism, and the extent to which provincial members of the GSL, such as Mantell[99] in the 1820s and 1830s, were able to participate in the Society's activities and be elected to the council. Since the term 'provincial' has pejorative as well as geographical connotations, the following classifications have been adopted for all members of council in this particular analysis.

- London (L): Permanent residence in London.
- Country/London (CL): Social Category 1 members of council who had a country seat and a London residence or were members of a recognised London club.
- London Base (Lb): Members of council whose occupation entailed country or overseas travelling, but who had access to a London base, for example, Army Ordnance officers, diplomats and members of London clubs.
- Cambridge/Oxford (CO): Members of council who held academic positions at either of these institutions.
- Provincial-Clergy (PC): Members of the clergy situated in the country, but able to afford the time and expense to visit London whenever desired.
- Provincial (P): Members of council situated in the country with no established London base and who could not afford to be absent from their occupational base for long and frequent periods.

(4) INSTITUTIONAL POWER AND STATUS

[99] Until 1833 Mantell lived at Lewes, Sussex. In 1838 he moved from Brighton to Clapham Common, London.

Institutional status is an important factor. In addition to conferring prestige in its own right, it gives the holder both direct and indirect power to formulate agendas, decide priorities, facilitate publication of papers, and above all, to exclude. It also provides a base for networking and for the informal exchange of information and gossip. In the screening analyses, institutional status is defined and specified according to the senior positions held, and length of time served, on the GSL council. Other criteria of institutional power that are taken into account include election to the council of the Royal Society of London, and during the last two decades, service on the council of the BAAS. The introduction of these criteria ensures that a particular member of council was well regarded outside the bounds of the GSL. The various screening criteria concerning institutional status are summarised below.

INSTITUTIONAL STATUS CRITERIA

INSTITUTIONAL SCREENING CRITERIA	NUMBER of MEMBERS of COUNCIL[100]
Members who served one term on the GSL council during that decade	250
Members who held the position of President, Vice- President, Secretary, Foreign Secretary or Treasurer, and who also served on the council for a minimum cumulative period of 3 years to the end of that decade.	94
Senior GSL office and 6 years cumulative council service to the end of that decade.	66
Senior GSL service and 9 years cumulative council service to the end of that decade.	42
Senior GSL service, 9 years cumulative council service to the end of that decade, plus election to the council of the Royal Society of London.	21

(5) CONTEMPORARY GEOLOGICAL ACHIEVEMENT

In the analyses the initial measure of contemporary geological and scientific achievement is based on the number of publications made by each member of council in any of the following ways:

- Papers read to the GSL before 1 January 1851 and published in full or summary form in the *Transactions, Proceedings*, or *Quarterly Journal of*

[100] These numbers include multiple counting since some members of council served over two or more decades.

the Geological Society of London.

- All papers published in the *Philosophical Transactions of the Royal Society of London* and read before 1 January 1851.
- Books published on geological, natural history or medical matters before 1 January 1851.

Articles published in other journals, such as the *Annals of Philosophy* or *The Edinburgh New Philosophical Journal*, have been excluded for reasons of expediency, since the purpose of the analyses is to identify those members of council who were relatively more active in geological investigations and who published in the more specialist journals. In the final and more rigorous screenings, the awarding of the Royal and Copley medals by the Royal Society of London, and the Wollaston medal by the GSL, are used as additional criteria of contemporary geological achievement.

2.2.3 SOURCES OF INFORMATION

The major source for biographical details of members of the GSL council has been *The Dictionary of National Biography*,[101] supplemented by the following additional references:[102]

- *Dictionary of Scientific Biography* (18 vols), 1970.
- Foster, J., *Alumni Oxoniensis*, 1715-1886 (2 vols), 1968.
- *Record of the Royal Society*, London, 1912.
- Sarjeant, W.A., *Geologists and the History of Geology* (5 vols), 1980.
- Stenton, M. (ed.), *Who's Who of British Members of Parliament*, Vol. 1, *1832-1885*, 1976.
- Venn, J.A., *Alumni Cantabrigiensis*, Part II, *1754-1900* (6 vols), 1951.
- Woodward, H.B., *The History of the Geological Society of London*, 1908.

Additionally, data have been obtained from the Obituary notices contained in

[101] L. Stephen and S. Lee (eds), *The Dictionary of National Biography*, (22 vols), Oxford University Press, London, 1949-50.
[102] Full details of these well-known references are contained in the bibliography of the thesis.

the President's annual report of both the GSL and Royal Society of London[103] and in *The Gentleman's Magazine*.[104] Information concerning the number of publications of each of the GSL members of council was obtained from four main sources:

- The Table of Contents of each volume of the *Transactions, Proceedings, and Quarterly Journal of the Geological Society of London*, from 1811 until 1851. These data have been cross-checked against the summaries contained in *A Classified Index to the Transactions, Proceedings, and Quarterly Journal of the Geological Society of London*.[105]
- *Index to the Proceedings of the Royal Society of London 1800-1905*.[106]
- *The English Catalogue of Books...,1801-1836*,[107] and *The English Catalogue of Books from 1835-1863*.[108]
- *Catalogue of Scientific Papers (1800-1863) compiled and published by the Royal Society of London*, vols. 1-6, London, 1867-72.

Details concerning the election of members of the GSL council, and offices held, have been obtained from Woodward's *History of the Geological Society of London*[109] and the *Transactions, Proceedings, and Quarterly Journal* of the GSL.

2.2.4 PROCEDURES

[103] *Proceedings of the Geological Society of London*, 1827-1845, *1-4*, *Quarterly Journal of the Geological Society of London*, 1845-80, *1-36*; *Abstracts of the Papers communicated to the Royal Society of London*, 1832-50, *1-6*; and *Proceedings of the Royal Society of London*, 1830-55, *7 -30*.
[104] *The Gentleman's Magazine and Historical Chronicle*, London, 1820-1869.
[105] G.W. Ormerod, *A Classified Index to the Transactions, Proceedings, and Quarterly Journal of the Geological Society of London: including all the memoirs and notices to the end of 1868*., 2nd, edition, London, 1870.
[106] *Index to the Proceedings of the Royal Society of London (Old Series), Vols 1-75, 1800-1905*, Harrison and Sons, London, 1913.
[107] R.A. Peddie and Q. Waddington (eds), *The English Catalogue of Books: giving in one Alphabet, under Author, Title and Subject, the Size, Price, Month and Year of publication, and Publisher of Books Issued in the United Kingdom of Great Britain and Ireland. 1801-1836*, The Publishers Circular Limited, London, 1914.
[108] S. Low, *The English Catalogue of Books from 1835 to 1863 published from January 1835, to January 1863*, Sampson Low, Son and Marston, London, 1864.

The basic procedure adopted in the prosopographic and screening analyses consists of a succession of straightforward, screening processes. The backgrounds of all members of council are juxtaposed against increasingly rigorous criteria relating to institutional power and geological achievement. Specific difficulties encountered are noted in the accompanying text.

[109] Woodward, *op. cit.* (note 16), pp. 286-308.

2.4 RESULTS AND DISCUSSION

The aims of the various prosopographic and screening analyses are to discern any changes or trends in the overall social composition of members of the GSL council over the four decades; to examine the characteristics of those members of council who attained both high institutional and geological achievement status; to identify, at least provisionally, those who could qualify as members of a geological 'elite'; and finally, to note any relevant factors that may have had a mitigating influence or effect on Mantell's career in particular. The results of the analyses follow and are discussed in the same order as these aims.

Summary prospographic details of all members of council are contained in Appendix 1.

2.3.1 OVERALL TRENDS IN MEMBERS OF THE GSL COUNCIL

(1) GENERAL SOCIAL AND OCCUPATIONAL CHARACTERISTICS

TABLE 2.2 – TRENDS IN SOCIAL STATUS OF MEMBERS OF COUNCIL

STATUS CATEGORY	1807 - 1820	1820 - 1830	1830 - 1840	1840 - 1850
Number of members of council	61	71	60	58
Number in Social Category 1 (U1 - U3)	30 *49%*	38 *53%*	41 *68%*	39 *67%*
Number in Social Category 2 (M1 - M3)	26 *43%*	29 *41%*	17 *28%*	19 *33%*
Social Category not determined[110]	5 *8%*	4 *6%*	2 *4%*	- *0%*

[110] Members of council whose social status was not determined due to incomplete information are: 1807-1820: – A. Apsley, S. Davis, A. Jaffray, T. Murdoch, E.W. Rundell; 1820-1830 – T.C. Harrison, F. Moysey, T. Smith, and J. Vine; 1830-1840: – A. K. Barclay and A. Robe.

TABLE 2.3–OCCUPATIONAL STATUS OF MEMBERS OF GSL COUNCIL

OCCUPATIONAL STATUS	1807 - 1820	1820 - 1830	1830 - 1840	1840 - 1850
Number of Members of Council	61 *100%*	71 *100%*	60 *100%*	58 *100%*
Independent Gentlemen	15 *25%*	15 *21%*	16 *27%*	16 *27%*
Gentleman and Clergyman - specialists	3 *5%*	8 *11%*	14 *23%*	15 *26%*
Recognised Professions	23 *38%*	30 *42%*	21 *35%*	14 *24%*
Business Proprietors	11 *18%*	7 *10%*	2 3%	5 *9%*
Curators, Lecturers	5 *8%*	7 *10%*	6 *10%*	7 *12%*
Not determined[111]	4 *6%*	4 *6%*	1 *2%*	1 *2%*

Although there are no pronounced trends evident in the above tables, several observations can still be made. First, after 1830 the percentage of Social Category 1 members of council increases from one half to a more dominant two-thirds. This increase is also reflected in changes in the overall

[111] Members of council whose occupational status was not determined due to insufficient data are: 1807-1820: – S. Davis, A. Jaffray, T. Murdoch, and E.W. Rundell; 1820-1830: – T.C. Harrison, F. Moysey, T. Smith, and J. Vine; 1830-1840: – A.K. Barclay; 1840-1850: – S.P. Pratt.

occupational pattern. After 1830, those members of council meeting the criteria of 'gentleman or clergyman-specialist' emerge as a distinct group, constituting 23 to 26 per cent of councillors compared to 5 to 11 per cent during the previous two decades, when the terms were essentially confined to the Oxbridge academics, Buckland, Sedgwick and Tennant.[112]

A further reason for the increased proportion of Social Category 1 members of council after 1830 is an increase in the number of members in the U3 sub-category, due to successful and ambitious professionals, as well as established business proprietors, advancing from the M1 sub-category. Members of council reflecting this increased social status are the surgeon Sir Alexander Crichton,[113] the sculptor Sir Francis Chantrey,[114] and those now less occupied with their business interests, such as Leonard Horner and John Taylor.[115] This trend is illustrated in the next two tables.

TABLE 2.4 – STATUS TRENDS OF GSL MEMBERS OF COUNCIL

CATEGORY 1

[112] Smithson Tennant (1761-1815). Professor of Chemistry, Cambridge University, 1813-15. *DNB.*
[113] Sir Alexander Crichton (1763-1856). Edinburgh and European educated surgeon and physician. Member of GSL council 1824-27, 1830-31 and 1836-37. *DNB* and Woodward, *op. cit.* (note 16), on p. 301.
[114] Sir Francis Chantrey (1781-1841). Sculptor born in humble circumstances. FRS 1818, Knighted in 1835. Member of GSL council 1830-31, 1833-34 and 1841-42. *DNB* and Woodward, *op. cit.* (note 16), on p. 301.
[115] John Taylor (1779-1863). Born into a prosperous Unitarian family. Became a major figure in British mining activities. Member of GSL council 1815-22 and 1823-45 and Treasurer 1816-21 and 1823-43. *DNB* and Woodward, *op. cit.* (note 16), pp. 298 and 306.

STATUS CATEGORY	1807-20	1820-30	1830-40	1840-50
Number of Members of Council	61	71	60	58
U1	8 *13%*	13 *18%*	10 *17%*	11 *19%*
U2	12 *20%*	14 *20%*	16 *26%*	14 *24%*
U3	10 *16%*	11 *15%*	15 *25%*	14 *24%*
Total Category 1	30 *49%*	38 *53%*	41 *68%*	39 *67%*

TABLE 2.4 (continued)

CATEGORY 2

STATUS CATEGORY	1807-20	1820-30	1830-40	1840-50
M1	16 *26%*	19 *27%*	10 *17%*	17 *29%*
M2	8 *13%*	6 *8%*	6 *10%*	2 *4%*
M3	2 *3%*	4 *6%*	1 *2%*	- -
Total Category 2	26 *43%*	29 *41%*	17 *29%*	19 *33%*
Not determined	5 *8%*	4 *6%*	2 *3%*	- -

Another factor explaining the decline in the proportion of members of council in Social Category 2 from around forty per cent during the first two decades, to thirty per cent after 1830, was the retirement of the former Askesian

Society Quakers, W. Allen,[116] W.H. Pepys,[117] Richard[118] and William Phillips[119] and Samuel Woods.[120] The gradual exodus of this particular sub-group is also a major factor in explaining the decline in the percentage of members of council engaged in business activities after 1830. A further point relating to Social Category 2 is the relatively small percentage of members of council belonging to the M3 sub-category during each of the four decades.

(2) MEMBERSHIP OF THE ROYAL SOCIETY OF LONDON

TABLE 2.5 – TRENDS IN MEMBERSHIP OF THE ROYAL SOCIETY OF LONDON BY MEMBERS OF THE GSL COUNCIL

	1807-20	1820-30	1830-40	1840-50
Number of members of council	61	71	60	58
Number who were FRS by the end of decade	43	51	49	44
Percentage	70%	72%	82%	76%

The consistently high percentage of members of the GSL council who were Fellows of the Royal Society of London by the end of the decade in which they served on the GSL council, can be regarded as an indication of the prestige of the GSL council. However, only 46% of all councillors had been

[116] William Allen (1770-1843). Chemist. FRS. Son of a Quaker silk manufacturer. Original member of GSL and member of council 1808-10. *DNB.*
[117] William Hasledine Pepys (1775-1856). Quaker manufacturer of surgical instruments. Helped to found the Askesian Socety. Original member of GSL and member of council 1807-19 and 1820-28. *DNB.*
[118] Richard Phillips (1778-1851). Son of a Quaker London printer and book-seller and brother of William. Chemist. FRS. Co-founder of the Askesian Society. Original member of GSL and member of council 1808-11. *DNB*
[119] William Phillips (1775-1828). Quaker printer and book-seller. FRS. Co-founder of the Askesian Society and original GSL member. Member of GSL council 1810-13. *DNB.*
[120] Samuel Woods. Early member of Askesian Society. Quaker. Member of GSL council 1809-15. Inkster, *op. cit.* (note 27), p. 22 and Woodward, *op. cit.* (note 16), p. 308.

elected as Fellows of the Royal Society at the time of their election to the GSL council.

	1807 - 1820		1807 - 1850	
	No.	%	No.	%
FRS before election to GSL council	28	*46%*	78	*46%*
FRS after election to GSL council	23[121]	*38%*	58	*34%*
GSL members of council who were not elected FRS	10	*16%*	33	*20%*
TOTAL	61	*100%*	169	*100%*

(3) LONDON vs PROVINCIAL BASE

Because Mantell was based in provincial towns until 1838, the purpose of this particular analysis was to identify the number of other provincial members of council in the Society.

[121] This figure includes members of council who became FRS after 1820.

TABLE 2.6 – DOMESTIC BASE OF MEMBERS OF THE GSL COUNCIL

	1807-20	1820-30	1830-40	1840-50
No. of Members of Council	61	71	60	58
London (L)	36	39	31	31
Country/London (CL)	14	19	14	16
London base (Lb)	4	8	7	6
Cambridge-Oxford (CO)	2	2	6	4
Provincial-clergy (PC)	2	1	2	-
Provincial (P)	-	1	-	1
Unknown[122]	3	1	-	-

None of the four members of council classified as Provincial-clergy[123] would have been regarded by their contemporaries as a 'provincial' in a socially derogatory sense. This observation would also have applied to the Oxbridge academics such as Buckland, Sedgwick, Henslow,[124] and Hopkins[125]. Thus the only two members of council classified as truly provincial are Gideon Mantell[126] of Lewes (1825-1826) and James Smith[127] of Glasgow, (1841-1842). However, there is a significant difference between the circumstances of these two men. In 1825, when Mantell was elected to his first term on the GSL council, he was entirely financially dependent on his busy medical practice at Lewes. In contrast, Smith was independently wealthy, with a substantial income from a silent partnership in a West India merchant firm.

[122] Members of council whose domestic base was not determined are: 1807-20: – Capt. A. Apsley, S. Davis, and A. Jaffray; 1820-30: – T. Smith.
[123] Clergymen in this category were: 1807-1820 - Rev. E.J. Burrow (P.C. of Bempton Yorks 1810-16) and Rev. M. Raine (Headmaster, Charterhouse School 1791-1811); 1820-1830: Revd. W.D. Conybeare (Based near Bristol until 1836 when he presented himself to the family living of Axminster); 1830-1840: Rev. W.D. Conybeare and Rev. J.H. Randolph (Rector of Northolt, Middlesex, 1822-35). Conybeare was the only one of the four who published any papers on geology.
[124] Rev. John Stevens Henslow (1796-1861). Professor of Mineralogy, Cambridge University, 1822-27 and subsequently Professor of Botany 1827-61. *DNB.*
[125] William Hopkins (1793-1866). Cambridge mathematician and geologist. *DNB.*
[126] G.A. Mantell also served as a GSL member of council from 1841-44 when he resided at Crescent Lodge, Clapham Common, London, and from 1847-52, when he lived at 19 Chester Square, Pimlico.
[127] James Smith (1782-1867). Eldest son of Archibald Smith, a West India merchant. Lived at Jordanhill, near Glasgow. FRS 1830. Served as President of the Geological Society of Glasgow.

Moreover, from 1839 to 1849, a period that includes his one year of service on the GSL council, Smith spent much of his time abroad because of concerns for his family's health. This analysis therefore highlights Mantell as essentially the singular 'provincial' on the GSL council during the period 1807 to 1850.

(4) GEOLOGICAL ACHIEVEMENTS OF MEMBERS OF COUNCIL

TABLE 2.7 – GEOLOGICAL PUBLICATIONS OF COUNCIL MEMBERS

CRITERIA	1807-20	1820-30	1830-40	1840-50
Number of members of council	61	71	60	58
Number of members of council who did not publish during that decade	29 *48%*	25 *35%*	17 *28%*	10 *17%*
Members of council who had published 3 or more geological papers cumulatively by the end of decade	10 *16%*	21 *30%*	24 *40%*	31 *53%*

The pattern of increased publication by GSL members of council over the four decades is not surprising. The above table becomes more meaningful, however, when used in conjunction with those detailing trends in institutional power.

Studied glacial questions and was an authority on ancient ship-building. *DNB.*

2.3.2 TRENDS IN GSL MEMBERS OF COUNCIL WHO SERVED ON THE COUNCIL FOR A MINIMUM PERIOD OF THREE YEARS AND WHO ALSO HELD SENIOR OFFICE IN THAT DECADE.

TABLE 2.8 – SOCIAL STATUS TRENDS

SOCIAL CATEGORY	1807-20	1820-30	1830-40	1840-50
Number of members of council	25	26	19	24
Social Category 1	12 *48%*	15 *58%*	16 *84%*	20 *83%*
Social Category 2	13 *52%*	11 *42%*	3 *16%*	4 *17%*

TABLE 2.9 – OCCUPATIONAL TRENDS

OCCUPATIONAL STATUS	1807-20	1820-30	1830-40	1840-50
Independent Gentlemen	8 *32%*	4 *15%*	6 *32%*	7 *29%*
Gentleman and Clergyman Specialists	1 *4%*	5 *19%*	9 *47%*	10 *42%*
Recognised Professions	7 *28%*	9 *35%*	3 *16%*	4 *17%*
Business Proprietors	6 *24%*	6 *23%*	-	2 *8%*
Curators / Lecturers	3 *12%*	2 *8%*	1 *5%*	1 *4%*

TABLE 2.10 – PROVINCIALS AND ROYAL SOCIETY STATUS

(Councillors with 3 years service and who held senior office in that decade)

	1807-20	1820-30	1830-40	1840-50
Number of members of council	25	26	19	24
Provincial Clergymen	-	1 *4%*	1[128] *5%*	-
Provincials	-	-	-	-
F.R.S.	17 *68%*	21 *81%*	17 *89%*	17 *71%*
Also served on the council of the Royal Society	1 *4%*	2 *8%*	10 *53%*	14 *58%*

The general trends revealed in the previous analyses covering all members of the GSL council become more accentuated when the investigations are restricted to those who held senior office and served on the council for a minimum of three years. Furthermore, the change in the 1830s is particularly pronounced. The percentage of members of council in Social Category 1 increases from around 55 per cent to 83 per cent (Table 2.8) and the 'gentleman and clergyman-specialists' emerge as the largest occupational group, comprising 42-47 per cent of members of council meeting the more rigorous institutional criteria (Table 2.9). The decline in the relative number of business proprietors, as well as council members engaged in the traditional professions, is also a prominent feature of the last two decades.

Additionally, the emergence of a 'power elite' is indicated by the post-1830 increase from 8 per cent to more than 50 per cent in the number of members of council who also served on the council of the Royal Society of

[128] Rev. W.D. Conybeare was the GSL member of council during both decades.

London. A further point is the absence of any provincials in this more restricted group.

2.3.3 IDENTIFICATION OF A GEOLOGICAL ELITE

The starting base for the final series of screening tests comprises those members of council who held senior GSL office during that particular decade, and who also served on the council for a minimum, cumulative period of three years. Since previous analyses indicate significant changes after 1830, the methodology adopted has been to progressively increase the criteria for both institutional status and geological achievement until a marked change in the percentage pattern occurs after that year. This occurs after the application of the fourth series of screening criteria, as indicated in the following table.

TABLE 2.11 – SCREENING CRITERIA FOR IDENTIFYING A GEOLOGICAL ELITE

Number and Percentage of Members of Council

Screening Criteria	1807-20	1820-30	1830-40	1840-50
1. Senior GSL office, Member of council 3 years.	25 *100%*	26 *100%*	19 *100%*	24 *100%*
2. Senior GSL Office, Member of council 6 years.	11 *44%*	18 69%	16 84%	21 *87%*
3. Senior GSL Office, Member of council 6 years, min. of 3 geological or 5 natural history publications (cum.) by the end of that decade.	5 *20%*	14 *54%*	15 *79%*	18 *75%*
4. Senior GSL Office, Member of council 6 years, min. of 5 geological or 10 natural history publications (cum.) by the end of that decade.	3 *12%*	8 *31%*	12 *63%*	17 *71%*

(1) LIST 1 – SCREENING CRITERIA No. 4

TABLE 2.12 – LIST 1

MEMBERS OF COUNCIL IDENTIFIED AFTER SCREENING CRITERIA No. 4

1807-20	1820-30	1830-40	1840-50
3 members of council	8 members of council	12 members of council	17 members of council
Aikin	Aikin		Austen[130]
	Buckland	Buckland	Buckland
		Conybeare	Darwin
			Daubeny
		De la Beche	De la Beche
		Egerton	Egerton
	Fitton	Fitton	Fitton
		Hamilton	Hamilton
		Horner	Horner
	Lyell	Lyell	Lyell
Macculloch	Macculloch		
			Mantell
		Murchison	Murchison
			Owen
		Sedgwick	Sedgwick
			Sharpe
	Taylor	Taylor	Taylor
	Webster		
Wollaston	Wollaston[129]	Whewell	Whewell

[129] Whewell and Wollaston were the only two on this list who produced a minimum of 10 Natural History publications rather than a minimum of 5 Geological publications.
[130] Later Godwin-Austen (1808-1884).

(2) SCREENING CRITERIA No. 5 – LIST 2

Criteria selected for the following, more rigorous screening analysis are:

- Members of GSL council must have held senior GSL office during that decade, besides having served for a cumulative period of six years on the GSL council by the end of that decade.
- Produced a minimum of 10 Geological or 20 Natural History publications by the end of that decade.
- Also served on the council of either the Royal Society of London or The British Association for the Advancement of Science.
- Was a recipient or future recipient of the Copley or Royal Medal from the Royal Society of London or the Wollaston Medal from the GSL.

The above criteria for institutional power and contemporary geological achievement are considerably more demanding than those applying to screening criteria No. 4 in List 1. In all, thirteen members of council, including Mantell and Lyell, met these more stringent requirements.

TABLE 2.13 – LIST 2

MEMBERS OF COUNCIL IDENTIFIED AFTER SCREENING CRITERIA No. 5

1807-20	1820-30	1830-40	1840-50
	Buckland	Buckland	Buckland
		Conybeare[131]	
			Darwin
		De la Beche	De la Beche
			Egerton
			Fitton
		Lyell	Lyell
			Mantell
		Murchison	Murchison
			Owen
		Sedgwick	Sedgwick
		Whewell	Whewell
Wollaston	Wollaston		

(3) SCREENING CRITERIA No. 6 – LIST No. 3.

In the final screening test, the requirement concerning the senior office held in the GSL includes a term as President of the Society and the minimum time spent on the council has been increased from six to nine years. Additionally, the number of cumulative geological publications has been increased to 15, or 30 in the case of natural history.

[131] Conybeare only published 9, and not 10, of the prescribed publications up to the end of the decade. However, he published additional, significant papers in the *Philosophical Magazine* and *BAAS Reports*.

TABLE 2.14 – LIST 3

MEMBERS IDENTIFIED AFTER FINAL SCREENING CRITERIA.

1807-20	1820-30	1830-40	1840-50
	Buckland	Buckland	Buckland
			De la Beche
			Fitton
		Lyell	Lyell
		Murchison	Murchison
		Sedgwick	Sedgwick
		Whewell	Whewell

These final and most rigorous screening criteria reveal an identified elite of seven members of the GSL council, including Lyell, but not Mantell. Further analyses and investigations need to be carried out to ascertain if this group constitutes all, or even most members, of an acknowledged geological elite.

2.3.4 SOCIAL CHARACTERISTICS OF THE COUNCILLORS IDENTIFIED IN FINAL LIST 3.

TABLE 2.15 – SOCIAL CHARACTERISTICS OF THE MEMBERS OF COUNCIL IDENTIFIED IN THE FINAL SCREENING ANALYSIS

MEMBER OF COUNCIL	SOCIAL CATEGORY	BASE	OCCUPATIONAL STATUS
Buckland	U3-U2	Oxford	Clergyman-specialist
De la Beche	U3-U2	London	Gentleman-specialist
Lyell	U2	London	Gentleman-specialist
Fitton	U3-U2	London	Gentleman-specialist
Murchison	U2	London	Gentleman-specialist
Sedgwick	U3-U2	Cambridge	Clergyman-specialist
Whewell	M1-U3	Cambridge	Clergyman-specialist

The social and occupational characteristics of the post-1830 members of council who emerged from the final screening analysis are remarkably uniform. All are ‘gentleman-specialists’ or ‘clergyman-specialists’ with a residential base either in London, or at one of the two major English universities. Although all are in Social Category 1, none is in the more exclusive, sub-category, U1. It is also notable that most progressed socially during the course of their careers. Indeed, a reasonable case could be made that both Lyell and Murchison approached U1 status after being awarded their baronetcies in 1864 and 1866 respectively.

2.3.5 EXCLUSIONS

(1) COUNCILLORS ON PENULTIMATE LIST 2 BUT EXCLUDED FROM FINAL LIST 3.

TABLE 2.16 – MEMBERS OF COUNCIL EXCLUDED FROM THE FINAL LIST

	SOCIAL CATEGORY	BASE	OCCUPATIONAL STATUS
1807-30			
Wollaston	U2	L.	Gentleman
1830-40			
Conybeare	U2	Bristol[132]	Clergyman-specialist
1840-50			
Darwin	U2	CL.	Gentleman-specialist
Egerton	U1	CL.	Gentleman
Mantell	M1	L.	Surgeon-Physician
Owen	M1	L.	Comparative anatomist

There are some significant differences in the background characteristics of those members excluded by the final screening criteria, compared to the 'gentleman and clergyman-specialists' who exclusively comprised the final list. Wollaston was a physiologist and metallurgist rather than a geologist, although in many respects he can be regarded as a predecessor of the 'gentleman-specialist'. After 1830, Conybeare's geological output declined

[132] In 1823 Conybeare removed to the vicarage of Sully in Glamorganshire. He subsequently held the curacy of Banbury near Bristol. In 1836 he presented himself to the family living at Axminster, Devonshire. *DNB.*

markedly,[133] and he became more occupied with other interests.

Although Darwin had much in common with the 'gentleman-specialists' in List 3, he was less occupied with geological matters during the latter half of the 1840's. Sir Philip Egerton can be regarded as an archetype of the declining group of aristocratic 'amateurs'.

The most relevant exclusions are Mantell and Owen. Both men came from non-Category 1 backgrounds, and both had no private means and were financially dependent on their personal exertions. Above all, both men were intensely ambitious for scientific fame. Mantell was excluded from List 3 because he did not attain the position of President of the GSL and less importantly, served on the GSL council for seven and not ten years. The reasons for Owen's omission are similar.

(2) OTHER EXCLUSIONS

The geologists identified in List 3 as members of a prosopographic elite were selected through the combined application of two different types of screening criteria. Consequently, potential candidates who had outstanding qualifications in regard to only one of these two criteria would have been excluded; more specifically, those who did not become a GSL councillor, but who nevertheless carried out important geological investigations, and those whose geological output was limited, but who had considerable institutional power. Two such figures can be identified, John Phillips and Greenough.

Phillips was provincially based in York until 1840 and was not elected to the GSL council until 1853. However, well before his election to the GSL council, Phillips had completed some widely recognised and important studies on the geology of Yorkshire and published several notable books[134] on this region. He was awarded the Wollaston Medal in 1845 and his geological career was one of distinction. In contrast, Greenough only produced two

[133] By 1830 Conybeare had published 11 papers with the GSL and co-authored an important geological book with W. Phillips. After 1830 he published one paper with the GSL and one memoir on a landslip in Devon.

[134] J. Phillips, *Illustrations of the geology of Yorkshire; or, a description of the strata and organic remains of the Yorkshire coast: accompanied by a geological map, sections, and plates of the fossil plants and animals, Part I. The Yorkshire coast*, York, 1829; *Part 2. The Mountain Limestone District*, Murray, London, 1836.

geological publications[135] during the period 1807 to 1850, but was President of the GSL for three terms and served on the council continuously for 48 years.

Phillips and Greenough are the only two notable omissions from Lists 1, 2 and 3. Their careers and geological contributions are taken into account in the following chapter.

2.4 CONCLUSIONS

The prosopographic analyses exhibit several notable changes in the nature and pattern of members of the GSL council after 1830. One of the more significant of these changes is the emergence of the 'gentleman and clergyman-specialists' as a distinct group. In the period 1807 to 1830 the percentage of members of council who could be so classified was 5 to 11 per cent. In the 1830s this percentage increased to 23 per cent and to 26 per cent in the 1840s. This trend becomes even more marked when the members of council studied are restricted to those who held senior office and who served on the council for more than three years. Using these criteria, the 'gentleman- and clergyman-specialists' exceeded 40 per cent. Another associated trend is the increased upper status nature of the GSL council after 1830, with those belonging to Social Category 1 increasing from one-half to two-thirds. Using the more restrictive criteria of senior office and three years' council service, such members of council accounted for more than eighty per cent during the last two decades. In addition to the entry of the 'gentleman-specialists', other factors explaining this trend are the retirement of the former Askesian Society Quakers who belonged to Social Category 2, and the social advancement of ambitious and successful professionals and established business proprietors, such as Horner and Taylor.

The advent of the 1830s also marks a divide in the analysis indicating trends in the institutional power of members of council. During the 1830s an ongoing cadre of members of council emerged who had held senior office, were continually re-elected to the council, and in a wider context, also served

[135] G.B. Greenough, *A Critical Examination of the First Principles of Geology*, Longman, London, 1819; and 'Memoir to accompany the Second Edition of the Geological Map of England and Wales', *Proceedings of the Geological Society of London*, 1843-45, *3*, p.180. Also, in 1820, Greenough, with the help of Conybeare, Buckland and Warburton, 'coloured' and published Webster's large scale map of England and Wales. *DNB.*

on the council of the Royal Society of London. There was no such clearly defined group before 1830.

A significant observation, rather than a trend, is that out of the 169 members of council who served from 1807 until 1850, only two, Mantell (1825-26) of Lewes, Sussex, and Smith (1841-42) of Jordanhill, near Glasgow, had a provincial base, excluding the four members who were classified as 'provincial-clergy' and the Oxbridge academics. The importance of this factor, and its influence on Mantell's career, is examined in chapter four.

Several observations can be made about the 13 members of council who met the requirements of screening criteria No. 5 and are on penultimate List 2. First, there is only one member of council, the relatively older Wollaston,[136] a physiologist and metallurgist rather than a geologist, listed for the period 1807-1820. In the following decade, 1820 to 1830, he was joined by the 'clergyman-geologist', Buckland, the only member of council so identified for each of three decades. In contrast, seven members are identified in the 1830-1840 decade, and eleven for the period 1840 to 1850. This supports the earlier indication that 1830 marked a watershed in the affairs and development of the Society. It also suggests that it was not until 1830 that a geological elite emerged or could emerge.

Second, it is notable that penultimate List 2 includes two Social Category 2 members of council, Mantell (1841-44 and 1847-52) and Owen (1844-48), neither of whom had independent means. It is not until the final criterion of Presidency of the GSL is introduced that these two men are effectively eliminated from the final list of the identified elite. By stipulating this requirement, the seven identified members of council are revealed as belonging to Social Category 1, and more significantly, to the group identified as 'gentleman or clergyman-specialists'.

By their very nature prosopographic and associated screening studies are limited to highlighting the makeup, trends, and changing patterns of a specific group of actors over a particular period of time. They do not explain, directly, how and why such changes occur, except perhaps inferentially. The fact that all members of council on final List 3 belonged to Social Category 1 does not explain Mantell's exclusion. Further investigations need to be focused on one or more of the factors associated

with this status such as education, a London base, an established network of influential contacts and adequate private means to ensure sufficient time for geological investigations and travel. These factors are examined in chapter four, with special attention being given as to how they affected Lyell and Mantell.

Likewise, the various analyses do not explain why an apparent geological elite emerged after 1830. To this end the next chapter of this thesis explores the nature of the geological work carried out by the identified elite, and that of Lyell and Mantell in particular.

[136] Wollaston was 54 years of age in 1820 and died in 1828 .