Rijksmuseum van Geologie en Mineralogie 1878 - 1978

Past, Present, and Future

L. D. Brongersma

On the first of November, 1978, the Rijksmuseum van Geologie en Mineralogie (National Museum of Geology and Mineralogy), commemorated the day upon which, one hundred years ago, the first step was set on its way to independence. This gives occasion to review its past, its present state, as well as to try and look into its future. It will be evident that when discussing the present state and the possible future development of the museum (unless stated otherwise) the opinion given is that of the present author.

Before November 1st, 1878, the geological and mineralogical collections together with the zoological collections formed part of 's Rijks Museum van Natuurlijke Historie (National Museum of Natural History). Where in the following the Rijksmuseum van Geologie en Mineralogie (or the Geologisch-Mineralogisch Rijksmuseum as it used to be called before 1931) is mentioned, this will be indicated by the initials RGM; 's Rijks Museum van Natuurlijke Historie (since January 1931: Rijksmuseum van Natuurlijke Historie) will be indicated by the initials RMNH.

The account of RGM's history would not be complete if no attention was paid to the more than a hundred years that elapsed before it started on its way to independence. For the sake of convenience, the history may be divided in eight periods, which are of unequal length though: period before 1751, 1751 - 1820, 1820 - 1878, 1878 - 1922, 1922 - 1955, 1955 - 1961, 1961 - 1972, from 1972 onwards. It appeared advisable to present some additional information in notes, which have been placed at the end of the text, before the references.

The Past

PERIOD BEFORE 1751

Although, in 1598, one of the professors of the medical faculty (Pieter Paaw) was instructed to give demonstrations of minerals (in winter at his home) (Molhuysen, 1913, p. 113), this does not mean that mineralogy (as one of the earth sciences) was taught at that time. The demonstrations of minerals formed part of the lessons on 'materia medica', to teach the students what ingredients — the 'simplicia' — of vegetable, animal, or mineral origin could be used in preparing the various kinds of medicine, such as potions, salves, unguents. This is evident from a petition by seventeen students, in which they described Dirk Outgaertszoon Cluyt (Clutius) who from May 5th, 1594 until his death in June 1598 has been in charge of the botanical gardens, as an able 'simplicist', well versed in the knowledge of herbs and minerals. They requested that Dirk Cluyt's son, Outger Cluyt, should be appointed to succeed his father, and that he had declared himself willing to demonstrate his herbs and minerals twice a week, or more often if desired (Molhuysen, 1913, p. 380* - 381*).

As pointed out by Suringar (1861, p. 125) even in the early seventeenth century a scientific approach to mineralogy was impossible as even the most elementary knowledge, which had to be provided by auxiliary sciences (such as chemistry), was lacking. Of the science that later was to be called geology one had no idea at all. The course given in 1704 by P. Hotton on 'fossils' and their use (Suringar, 1865, p. 285) will also have dealt with minerals as simplicia [1].

That there was no great interest in minerals as such is also shown by the fact that the University's Cabinet of Curiosities amongst a wide variety of objects (zoological, botanical, ethnographical) contained but one mineral: '55 Den steen Lapis Amyanthus, daer men Linnen af maeckt' (Anonymus, 1692, p. 4: the stone L. A. from which one makes linen; Benthem, 1698, p. 74: 'Lapis Amyanthus sive Asbistinus').

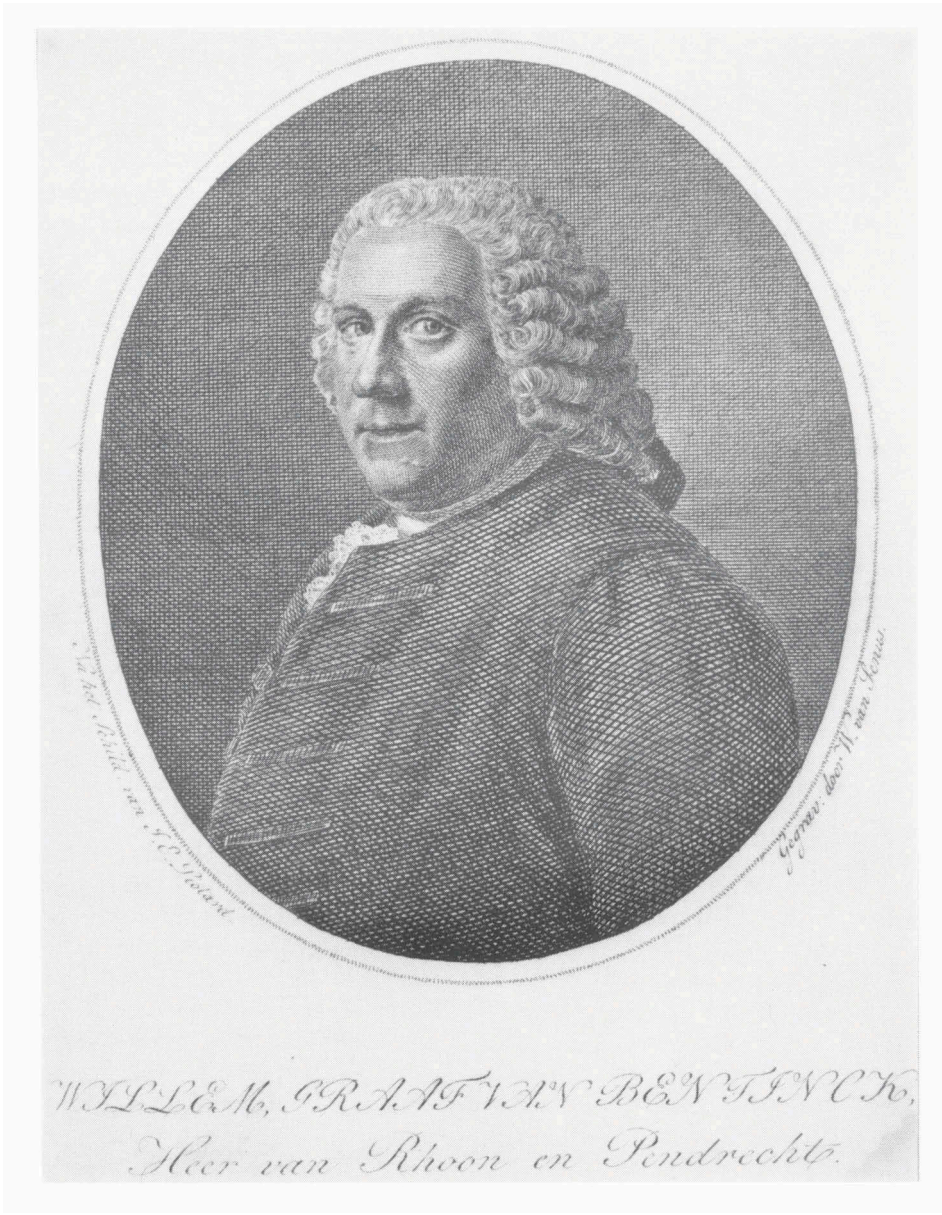

Fig. 1. Willem Count Bentinck of Rhoon and Pendrecht, Trustee of Leiden University, 1745 - 1774 (After M. Stuart, Vaderlandsche Historie, 3, 1824, plate facing p. 28). In the text the less common spelling 'Bentink' is used, such as it appears in the minutes of the meeting of the Board of the University. Photograph by W. A. M. Devilé, RGM.

1751 - 1820

The first move to a more directed collecting of natural objects was made on August 9th, 1751. On that day at a meeting of the Board of the University [2], one of the Trustees, Willem Count Bentink, Lord of Rhoon and Pendrecht, announced that he had handed over to Professor Allamand his collection of

minerals and other objects of natural history, and that it was his intention to add to this donation from time to time. Professor J. N. S. Allamand [3], professor of natural history, had already started to arrange this collection. Count Bentink suggested that Allamand should be asked to establish for the University a Cabinet of Natural History. After due deliberation, the proposal was adopted, and Allamand was instructed to proceed with the plans for the Cabinet of Natural History; the necessary expenses would be borne by the University. Allamand did so well that four years later he was awarded a gratuity of 400 guilders. In the course of years, the cabinet was enriched by donations, exchanges, and purchases; e.g., from his private collection Allamand gave specimens that were lacking in the University's Cabinet, and in exchange for which he took duplicates from the Cabinet. An important acquisition (in 1754) must have been the collection of fossils, rock samples, minerals, cut and uncut stones, brought together by Dr C. Zumbach de Coesfelt [4]. For this collection Zumbach was to receive the sum of 300 guilders on the day the collection was handed over to the University and after that, during his life-time, annually the sum of also 300 guilders. In his offer, Zumbach speaks of his advancing years, and it seems that the Trustees did believe (or hope) that not many instalments would have to be paid, but for twenty six years the University had to pay this sum, until Zumbach died in 1780. The handwritten catalogue of this collection is present in the University's archives. However, in the RGM collections there are no labels in the handwriting of Zumbach's catalogue, but it may well be that the specimens have been relabeled when they were incorporated in the Cabinet. It would certainly be interesting to try and trace what has been preserved of the collections from the early stages of the Cabinet [5]. A search in the University's archives may perhaps give information about other acquisitions.

Allamand remained in charge of the Cabinet of Natural History till his death on March 2nd, 1787. From 1753 - 1761 he was assisted by J. le Francq van Berkhey [6], who later (1773 - 1795) became 'lector' (reader) of natural history, and who in this position may again have been connected to the Cabinet; he made reference to the collections, when he stated (Berkhey, 1771, p. 754) that the Leiden 'Museum' contained more than three hundred kinds of marble.

Allamand was succeeded by Prof. S. J. Brugmans [7], who came to Leiden in 1786 as professor of botany; in 1787 he was also appointed professor of natural history (zoology, geology, mineralogy), and as such he was in charge of the Cabinet of Natural History; in 1795 he started lecturing on chemistry and in 1800 he was appointed professor in this science. Thus he held three chairs, and he had many commitments besides.

At the age of eighteen, Brugmans obtained the degree of doctor of philosophy (Groningen, 1781) and four years later that of doctor of medicine (Groningen, 1785) thus following the pattern usual at the time. His father, Professor A. Brugmans, had already intimated that the erratics found in the soil of the province of Groningen, must have had their origin in countries far away. S. J. Brugmans, in his thesis of 1781, arrived at the conclusion that these erratics were of Scandinavian origin (Mesch, 1825, p. 317; Capadose, 1825, pp. 401 - 403, 551 - 553, note 14; Suringar, 1870, p. 40). Notwithstanding his many commitments, Brugmans always kept his interest in geology (Suringar, 1870, pp. 46 - 47). As he had so many subjects to teach, each of those was dealt with in turn; in a report of March 3rd, 1807, Brugmans mentioned this, adding that each student staying at the University for four or five years would have an opportunity to attend

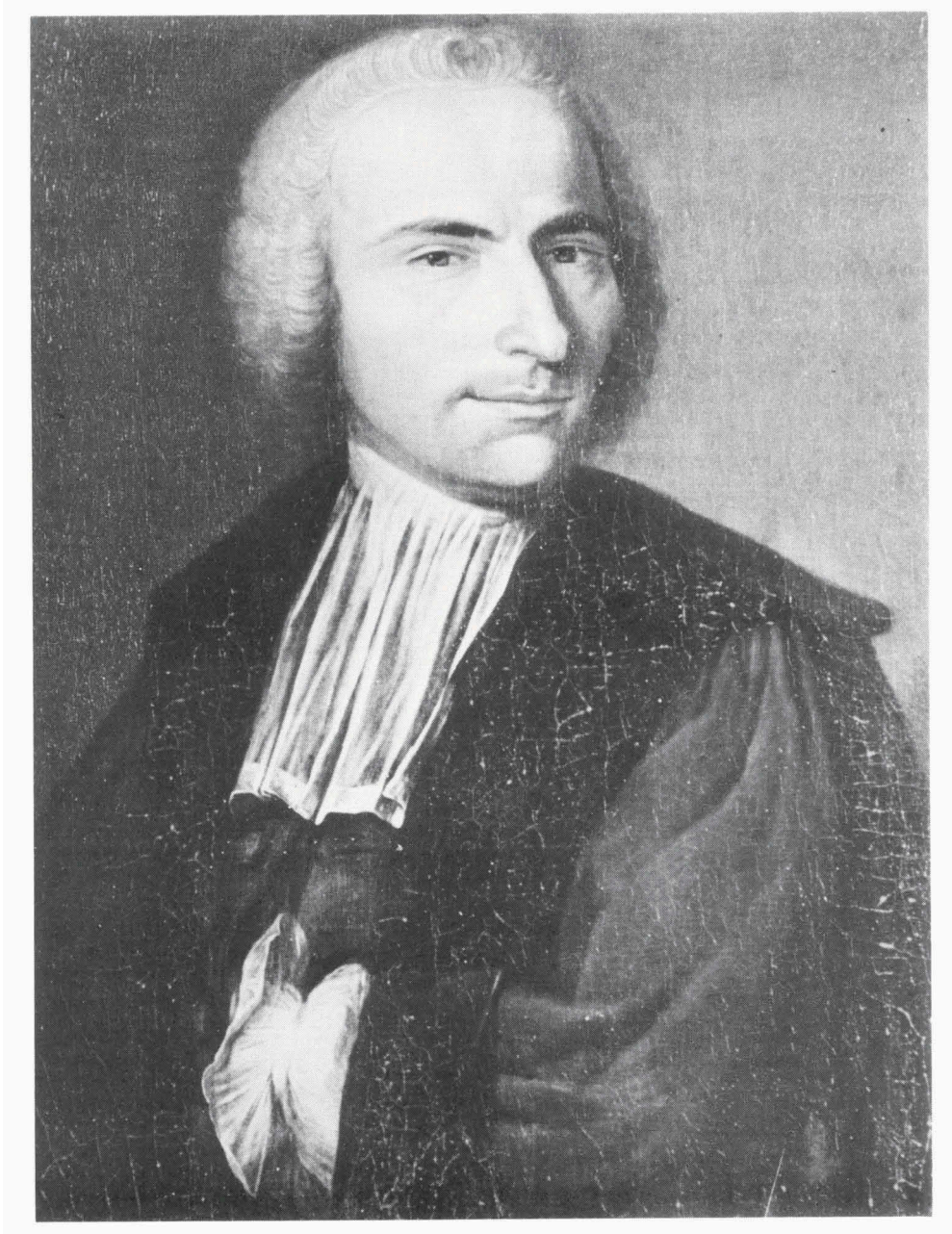

Fig. 2. Professor J. N. S. Allamand, director, Cabinet of Natural History, 1751 - 1787. Courtessy Mr R. E. O. Ekkart

courses in general zoology, comparative anatomy, systematics of one or another of the more important animal classes, and in mineralogy or geology (Brugmans, in Molhuysen, 1924, p. 88*). Brugmans did much to enrich the Cabinet. In 1800 he donated about 300 geological samples (Molhuysen, 1924, p. 156), and Brugmans himself (in Molhuysen, 1924, p. 90*) states that he has added to the series in the Cabinet, that what he possessed himself, or what he had collected on his

Fig. 3. Professor S. J. Brugmans, director, Cabinet of Natural History, 1787 - 1819. Photograph by W. A. M. Devilé, RGM.

travels. Besides, specimens or collections were purchased, e.g., from the Cabinet of Professor Nahuys, Utrecht (June 1800: Brugmans, in Molhuysen, 1924, p. 156) and during his last journey into Germany (1818) at Brunswick the mineral collection of Bruckmann was purchased (Mesch, 1825, p. 310; Capadose, 1825, pp. 516 - 519).

It was largely due to Brugmans that the Leiden collections escaped the fate of many other cabinets, which were taken to France by the looting French armies (looting at the command of their rulers). When in 1813 the Netherlands had been freed from French occupation, some of Brugmans's colleagues seem to

have blackened him, as they considered him to have been too friendly with the French. As Rector Magnificus of Leiden University he was replaced, and he retired, but in 1815 he was re-appointed professor of natural history.

In 1795 the French had taken the Cabinet of Prince Willem V to France [8], and in 1815 King Willem I entrusted Brugmans with the task of tracing and bringing back his late Father's collections. After Waterloo, Brugmans, ranking as a major-general in the Netherlands Army Medical Corps, went with the allied armies to Paris, and this gave him an opening to visit French authorities. Besides, from earlier visits, made years ago, Brugmans knew several of the Parisian leading scientists. Through tact and perseverance Brugmans brought home the specimens that could be traced and recovered, accepting other specimens in compensation of those that were not returned. The collections were packed in Paris, and then were shipped to Rotterdam by way of Rouen. From Rotterdam they were brought to Leiden where they arrived on the 13th and 15th of December, 1815. Somewhat earlier, the King had decided (Royal Decree of November 3rd, 1815) to present these collections to Leiden University. Several cases of minerals were among the returned materials.

By Royal Decree of August 2nd, 1815, rules were set for the organizing of the higher education in the northern provinces of the Netherlands (i.e. the Netherlands of to-day, without Belgium). The three State Universities (Leiden, Groningen, Utrecht) each had to have a cabinet of natural history containing zoological specimens (including objects pertaining to comparative anatomy), as well as collections of rock samples and minerals for the tuition of geology. The professor of natural history was to be in charge of this cabinet. For Leiden this did not mean any change, as the university did already have such a cabinet since 1751. Brugmans was in charge of this cabinet, to which, as mentioned above, the collections of the late Prince Willem V had been added. Authorized by Royal Decree of May 18th, 1817, the Trustees appointed Dr P. G. van Hoorn to be deputy director of the Cabinet of Natural History (at a salary of 800 guilders p.a.). Van Hoorn had already assisted Brugmans in moving the cabinet from its original home (a building in the botanical gardens) to buildings situated on the Papengracht and Houtstraat; he also assisted in arranging the collections. Brugmans died on July 22nd, 1819. His private collections were purchased of his widow (Royal Decree of November 1st, 1819), partly to be incorporated in the Theatrum Anatomicum, partly in the University's Cabinet of Natural History (see note 11).

The Decree further ordained that 'the natural history of animals and minerals' should be taught annually at each of the Universities. That geology was considered a very important science follows from the fact that this science (and not botany or zoology) formed an obligatory part of the examination one had to pass before being allowed to present and defend a thesis for obtaining the degree of 'matheseos magister, philosophiae naturalis doctor' [9].

1820 - 1878

's Rijks Museum van Natuurlijke Historie was founded at Leiden by Royal Decree of August 9th, 1820, no. 75. To this purpose the collections of Dr C. J. Temminck [10] were purchased and presented to Leiden University, to be merged with the University's Cabinet of Natural History. To the museum thus formed was added the Cabinet of Natural History, present at Amsterdam, and in which

Fig. 4. H. M. King Willem I, founder of 's Rijks Museum van Natuurlijke Historie, 1820. Photograph by W. A. M. Devilé, RGM.

were kept the collections once owned by Louis Napoléon (1806 - 1810, king of Holland), and to which later other collections had been added. It was the express wish of King Willem I that the new museum should be known as the 'Rijks' or national museum (art. 5 of the Royal Decree).

Temminck became the museum's first director. This meant that in departure of the Royal Decree of August 2nd, 1815 (art. 195) the professor of natural history was relieved of his duties as director of the University's Cabinet. Often it is suggested that this change was due to the condition, made by Temminck when offering his collections to the State, viz., that during his life-time he should be their director. Of course, this will have influenced the decision, but from the

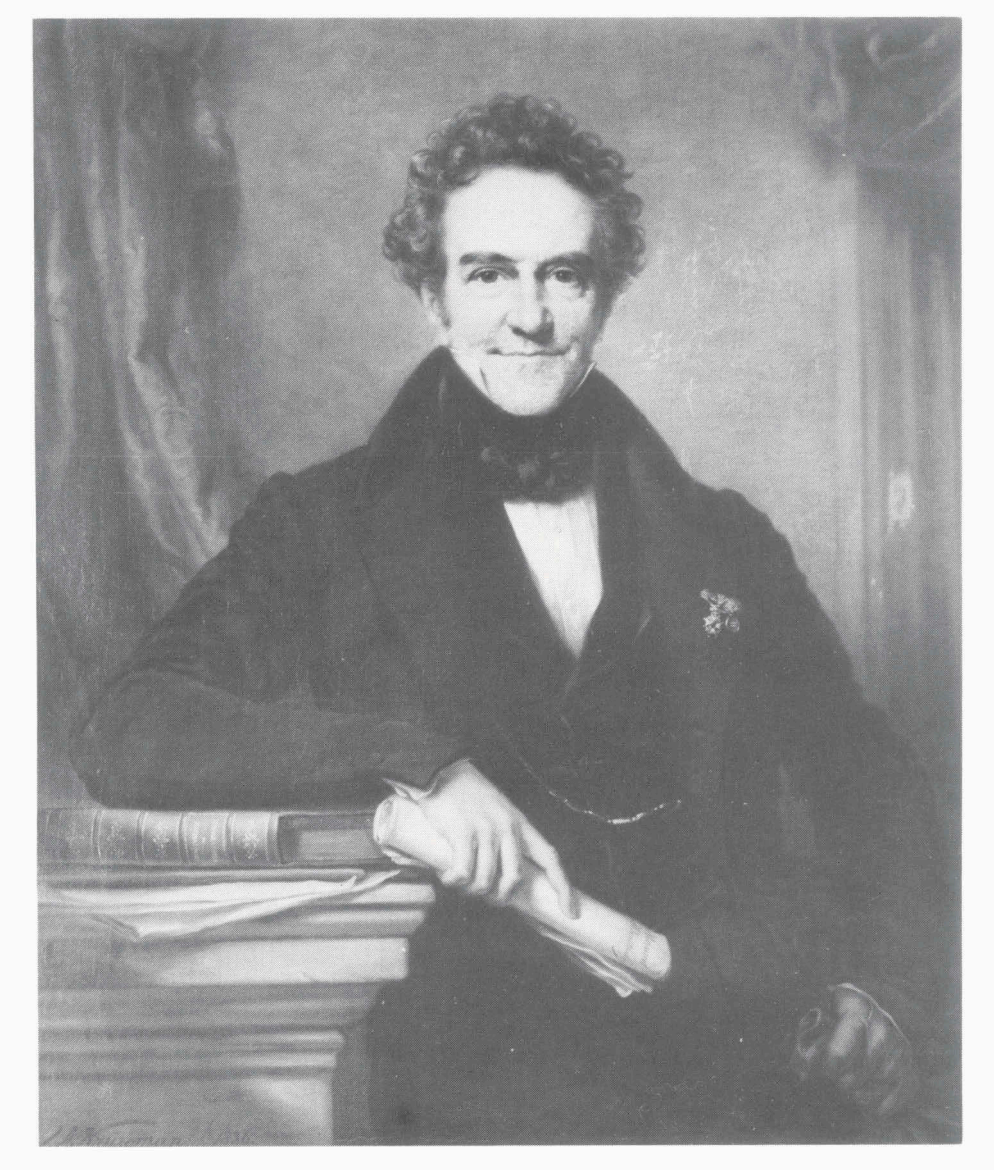

Fig. 5. Dr C. J. Temminck, director, 's Rijks Museum van Natuurlijke Historie, 1820 - 1858. Photograph by Chr. van Hoorn, RMNH.

correspondence it is clear that the withdrawal of the cabinet from the professor's care was a well-considered one. Besides, the circumstances were favourable for such a merger: 1, the chair of natural history at Leiden was vacant; 2, the director of the Amsterdam cabinet, Professor C. G. C. Reinwardt, was on a mission in the East Indies (since 1815), and the loss of his post at Amsterdam would be amply compensated by appointing him to the chair at Leiden; 3, the acting director at Amsterdam, during Reinwardt's absence, was: Temminck. There is nothing to show that the Trustees of the University were consulted beforehand; from their reaction (in litt., 21.X.1820, no. 86) with regard to financial problems and to the making available of duplicates to other universities, one would conclude

that the Royal Decree came as a complete surprise. Neither is there any indication whether the professors who, during the vacancy at Leiden, taught comparative anatomy (G. Sandifort, professor of anatomy in the medical faculty [11]) and natural history (J. Clarisse, professor of theology [12]) were consulted, but even if so they may have taken little interest in the future of the cabinet.

The mineralogical collections of RMNH were entrusted to the care of Dr P. G. van Hoorn [13], who was the cabinet's deputy director under Brugmans. It is said that Van Hoorn had expected to be Brugmans's successor, and the new arrangement must have come as a shock to him. When in 1821 Temminck sent instructions to Van Hoorn about the arranging of the minerals, Van Hoorn replied (letter of August 24th, 1821) that with the degree he had obtained (doctor of medicine, 1803), and with the social status he had at Leiden, he could not serve under Temminck in the subordinate position of deputy director. Temminck was self-taught in zoology, but he had reached international fame as an ornithologist and mammalogist; in 1819 the university of Groningen had conferred upon him an honorary doctor's degree (and in 1826 the University of Jena followed suit). Van Hoorn requested to be nominated director of the mineral section of the museum, or a nomination as second director. If this change of title would not be granted, he intended to resign, but in the end Van Hoorn accepted the title of 'Conservateur' (curator). In a letter to the Minister, Temminck (January 1822) expressed the wish that the curator should perform his duties with more diligence, and with less interruptions than the deputy director had done. From the Trustees Van Hoorn received written instructions to arrange the mineral collections in two series according to the classifications of Haüy and of Werner, respectively; furthermore he should prepare a series of rock samples. These three series would be on show, and could serve as an expedient to the study of geology. Also Van Hoorn should register all the available duplicates. Temminck's wish that the curator should attend the museum regularly was not fulfilled. At Temminck's request Fr. Moldenhauer, a student from Heidelberg (Germany), came to Leiden to arrange the mineral collections. In his report for the year 1822/1823, Temminck (in litt., 29.X.1823) mentions Van Hoorn's willingness to pay Moldenhauer's expenses for travelling to, and for his subsistence at Leiden. However, at a time when the work was still far from completed, Van Hoorn refused to make further payments. Temminck considered it warranted to let Moldenhauer finish his work at the expense of the museum; it could be completed within two months [14]. Van Hoorn had so many other functions that often he did not come to the museum for weeks on end. In December 1837 the Minister forced him to tender his resignation, and in January 1838 he left the museum's service.

After his return to Heidelberg, Moldenhauer set up a 'Mineralien Comptoir', buying and selling minerals, etc. In 1824, at Dresden he purchased of the widow of Hofrat Treutler a collection of precious stones. This collection was acquired by King Willem I, who in 1825 donated it to RMNH (Zwaan, 1978, pp. 3 - 4). The King's interest in the museum was shown at various other occasions; as far as the geological and mineralogical collections were concerned by donation, inter alia of four samples of natural gold from the island of Aruba (1826) and by such a sample from Borneo (1828). The palaeontological collections were enriched by a large bovid skull (1826) and several samples of deer antlers found during ground work in the Netherlands.

In February 1838, Van Hoorn was succeeded by E. M. Beima [15], and again the museum got a curator of geology and mineralogy, who had received

no special training in these subjects. Even when in 1842 Beima obtained a doctor's degree, his thesis had no bearing on geology, but it dealt with the rings of Saturnus. From his private means, Temminck supplied Beima with travelling funds to enable him to become acquainted with geology and mineralogy. Later, he accompanied a young Frisian nobleman on a journey to Jerusalem, visiting countries around the Mediterranean Sea, and bringing home many geological samples (report for 1852/1853, Temminck, in litt. 15.VII.1853). Beima also joined the Commission for the Geological Map of the Netherlands as a correspondent. It seems that Beima did take good care of the collections entrusted to him, but apparently he never published any original papers on the museum's materials.

On January 30th, 1858, Temminck died. A day before this happened, Professor J. van der Hoeven proposed to the Trustees that now was the time to revert to the stipulations of the Royal Decree of August 2nd, 1815. Van der Hoeven considered RMNH just to be the cabinet of natural history of Leiden Unuiversity (art. 193 - 194) of which he, as the professor of natural history, should be the director (art. 195). He appreciated that to obtain Temminck's collections one had had to act at variance with the decree by appointing Temminck director of the museum, but now matters should be set right again. The Royal Decree of June 16th, 1858, no. 42, attempted to comply with Van der Hoeven's wishes at the same time giving the museum's senior curator, Dr H. Schlegel, acting director during Temminck's illness, that what was due to him. Van der Hoeven was appointed 'Opperdirecteur' (director in chief), and Schlegel was appointed director and at the same time he was awarded the personal title of professor. This solution did not work. As the differences of opinion between Van der Hoeven and Schlegel referred mainly to the zoological collections, these do not need concern us here [16], but the outcome was that no cooperation at all was possible between these two. When Van der Hoeven experienced that factually he had nothing much to say in the museum's affairs, and that whenever he protested about this to the Trustees or to the Minister, it was Schlegel who got his way, Van der Hoeven addressed himself to the King (March 9th, 1860). He stated that as no attention was being paid to his objections to the course of things in the museum, there was no alternative left to him but to give up a position that never would give him satisfaction (Van der Hoeven, 1860, p. 25). By Royal Decree of June 16th, 1860, Van der Hoeven was honourably discharged from his function with RMNH, but he remained a professor.

The change from the directorate of Temminck to that of Schlegel was an important one. Both were self-taught zoologists, who had reached international fame. Temminck believed that one or two specimens of every species would do for the museum, all further specimens were duplicates that could be used with some profit in exchange with other museums. Schlegel believed that to know and characterize a species one should study it in all its variations, such as these were related to sex, age, season, distribution, etc. This meant the gathering of large series of specimens. Although mainly interested in vertebrate zoology, Temminck had an open eye for other fields of research, and he did everything possible to do justice to the various sections of the museum (inter alia, in 1821 he presented to RMNH a collection of three hundred rock samples from Transylvania and Wallachia). Schlegel's interest also was centred in vertebrate zoology, but as the bringing together and maintaining of extensive collections in this field was a time-consuming and costly business, he believed that spending part

Fig. 6. Profesor H. Schlegel, director, 's Rijks Museum van Natuurlijke Historie, 1858 - 1884. Photograph by Chr. van Hoorn, RMNH.

of the limited funds on other subjects was not warranted. As little or no original research had been done by the curators Van Hoorn and Beima, one can understand to some degree that Schlegel did not wish to spend money on this section of the museum. Still, one may ask whether the lack of results in the fields of geology and mineralogy may not have been due, in part at least, to the lack of funds allotted to them. When geological, mineralogical and palaeontological objects were offered for purchase, they were refused by Schlegel [17]. In 1869 the Minister (in litt., 21.IV.1869, no. 713, Kabinet, Geheim) suggested appointing J. A. H. Bosquet, apothecary, of Maastricht, as a curator of palaeonto-

logy, because Beima was not well versed in this field. This offer was refused (Schlegel, in litt. 31.VII.1869, no. 48); until the assistants in the vertebrate section received a better pay, he did not wish to expand the much less important geological section.

In this connection it may be added that the palaeontological collections did not form part of the geological and mineralogical section, but of the zoological one. A list of functions in RMNH, dating from 1829 (in the archives of the National Museum of Archaeology), mentions a curator for Vertebrates, Osteology, and Fossils. With these fossils will have been meant vertebrate remains; it was Schlegel who held this post, and that he himself was not averse of palaeontological research follows from his note on *Mosasaurus* (H. Schlegel, 1854) [18]. Invertebrate fossils were entrusted to the curator of invertebrates; the subsequent curators of this section of RMNH, Dr W. de Haan (Guilielmus de Haan, 1825), and Dr J. A. Herklots (1854) published on fossil invertebrates, viz., on ammonites and echinids respectively.

Professor J. van der Hoeven (in litt., 7.XII.1866) suggested that the chair of natural history should be split up, and that a 'lector' (reader) or a professor extraordinarius for mineralogy and geology should be appointed. He pointed out that he himself lacked the knowledge of chemistry, of some aspects of physics, and of mathematics, all necessary for understanding crystallography, and that, therefore, he could not teach mineralogy adequately. Although Van der Hoeven does not mention this, his proposal may well have been influenced by the departure from Leiden of Dr J. F. P. van Calker, assistant of the physics department, who in the years 1864 and 1865 had lectured on mineralogy (Anonymus, 1866: p. 239) [19]. When in the spring of 1866 Van Calker left, Van der Hoeven had to take over lecturing on mineralogy once more. Van der Hoeven suggested that the reader or professor teaching mineralogy, might also teach geology. Though, the knowledge of the fossil remains of animals formed a part of geology, the subject was so closely related to the subjects which he had to teach, that for the time being he could also lecture on fossil animals. In their letter of 30.III. 1867, the Trustees asked the Minister of the Interior to promote the establishing of a chair especially for mineralogy and geology. The Minister did not agree, but he promised to consider the matter when dealing with a reorganisation of higher education (in litt., 9.IV.1867, no. 213, 5e Afd.); probably the Minister was thinking of a bill that was being prepared and that was sent to the Second Chamber of the States General on January 15th, 1868 (soon to be withdrawn when a new Cabinet took over). The Trustees informed Van der Hoeven about this answer (in litt., 30.IV.1867, no. 18/106), and for the time being they let the matter rest.

On March 19th, 1868, Van der Hoeven died, and the Trustees once more suggested the splitting up of the chair (in litt., 28.V.1868, no. 28/230) as they considered it impossible to find someone who could adequately teach all the subjects that Van der Hoeven had taught; there should be a professor ordinarius for zoology, comparative anatomy, and anthropology, and a professor extraordinarius for geology and mineralogy. This time the Minister of the Interior replied by a proposal of his own (in litt., 24.VI.1868, no. 700, Kabinet, Secret). Professor H. Schlegel should be appointed professor of zoology and comparative anatomy for which he would receive 1000 or 1200 guilders p.a., at the same time remaining director of RMNH and retaining his pay as such; to his income would, of course, be added the tuition fee the students had to pay. The position of curator of geology and mineralogy should be abolished; the curator Dr Beima should be

dismissed, and he would be granted reduced pay (no amount mentioned). Then one could appoint a professor ordinarius for geology and mineralogy at 2800 guilders p.a. This professor would have the supervision and care of the mineralogical and geological collections of RMNH. In this way the number of staff would remain unchanged. If executed the plan probably would have served to save money.

However, now the Trustees objected to the proposals (in litt., 8.VII.1868, no. 28/230, 'Secret'). Though Schlegel held the personal title of professor since 1858, he did not lecture, did not hold a chair, was not a faculty member, and the Trustees dit not know whether he would be a good teacher, nor were they certain that Schlegel, at the age of 64, would like to start teaching; they could not even consult him as the Minister's letter was marked 'secret'. It seems very doubtful indeed that Schlegel would have liked to teach comparative anatomy, for this subject was outside his sphere of interest (and it was one he never had been taught). The Trustees feared that by combining the posts of director and full professor in one person, both tasks might suffer, and more probably even, that Schlegel would consider his teaching duties as a less important side-line. To dismiss, at the age of 67, a man like Beima, about whose performance of his duties there never had been any complaint, the Trustees considered a very harsh, and unwarranted decision. Also reducing the number of curators from three to two would not help to keep the collections in good order, and the professor of geology and mineralogy would be destitute of any assistance. Besides, the Minister's proposal implied that there would be two directors in RMNH: one director for the zoological collections, and one director for the geological and mineralogical collections, and remembering the difficulties between Schlegel and Van der Hoeven in 1858 - 1860, they could only foresee more trouble and clashes. Once more they pleaded for having two chairs instead of the one held by Van der Hoeven, and leaving RMNH as it was. The Minister did not give in (in litt., 11.VII.1868, no. 188, 5e Afd.); pending a decision whether all three Universities (Leiden, Groningen, and Utrecht) would be maintained, there could be no question of increasing the teaching staff. Van der Hoeven was succeeded by the zoologist E. Selenka, who was appointed by Royal Decree of September 27th, 1868, and who read his inaugural address on November 6th, 1868; he taught zoology, comparative anatomy, geology, and mineralogy.

The next move to separate the geological and mineralogical collections from those of zoology, followed Beima's death (24.II.1873). The Minister received two applications for Beima's post, but Schlegel informed the Minister (in litt., 14.X.1873, no. 32), that even if he would consider the appointing of a new curator for the geological and mineralogical section, the two applicants would not qualify anyway. As in his opinion geological objects did not need any special process of preservation, he saw no reason to appoint a new curator of geology and mineralogy. With the assistance of one of the zoological curators, Schlegel himself took charge of the geological and mineralogical collections, and this he found very easy apparently, fortifying him in the opinion that a curator especially for this section was unnecessary. Besides, he considered it far more important to appoint a curator for the extensive and valuable collections of vertebrate animals, a position which he had held before 1858, and which had not been filled again when he became director of RMNH.

Schlegel expressed his views to the Minister, stressing that scientific benefit would be obtained from the geological and mineralogical collections only if a

professor was appointed especially for teaching geology and mineralogy; of course, the relevant collections would be placed in the charge of this professor. Whether Schlegel was aware of the similar proposal by the minister in June 1868 (see above) we do not know; the correspondence between the Minister and the Trustees was marked 'secret', but it is not impossible that something of it transpired in the course of time. However this may be, the Faculty of Sciences (in litt., 2.XII.1873) asked the Trustees to promote the establishing of a chair for geology and mineralogy. The teaching of these sciences had been entrusted provisionally to the zoologist Selenka; neither he, nor the Trustees favoured the continuation of this provisional arrangement. The Faculty added that RMNH had a geological and mineralogical collection, as well as a collection of fossils, which formed an excellent basis for the collections necessary for tuition, be it that in the past years these collections might not have been cared for properly.

When Selenka resigned from the University, as from April 10th, 1874, to accept a chair at Erlangen (Germany), the Trustees passed on the Faculty's letter (2.XII.1873) to the Minister, stating that originally they had intended to wait until the proposals for the 1875 budget should be sent in, but that now an earlier solution was necessary. Therefore, they asked the Minister once more to propose to the King the establishing of a chair for geology and mineralogy, hoping that the objections of the previous Minister (16.VII.1868) did no longer hold good (in litt., 30.IV.1874, no. 60/24). The fact that after two abortive attempts to introduce and pass a new bill in higher education (25.II.1868; 15.III.1869), once more a bill had been introduced in January 1874, in which tuition in geology and mineralogy was mentioned among the subjects to be taught in each of the three universities, may have made them more hopeful. The Minister was not yet convinced (in litt., 22.V.1874, no. 212, Afd. V), as there would be only a very few students that would like to specialize in geology and mineralogy; the Minister asked whether not one of the other professors could undertake teaching mineralogy and geology, but the Faculty (in litt., 24.VI.1874) was unanimous in its reply that none of its members could add this task to his other duties. They stressed once more the importance of the geological sciences for the country and for its overseas possessions. The Trustees passed on this advice (in litt., 21.VII.1874, no. 25/235), but it was of no avail. The Minister asked for a nomination for a professor of zoology, and Dr C. K. Hoffmann, curator of RMNH, was appointed to the chair of zoology and comparative anatomy (Royal Decree of November 3rd, 1874; inaugural address: January 14th, 1875), but he also had to teach geology and mineralogy. In reply to a question by Jonkheer J. B. A. J. M. Verheijen in the Second Chamber of the States General (Session of December 7th, 1874) the Minister answered that if necessary the matter could be reconsidered later.

Eventually, a new law on higher education ('Hooger Onderwijs Wet van 1876') was passed in 1876, and it came into operation on October 1st, 1877. The law ruled that geology and mineralogy were to be taught in every university (art. 42, 4°, f, g) and even a doctorate in geology and mineralogy was introduced (art. 83, 4°, d). Although it still was possible to appoint one professor for teaching different subjects (art. 53), the consequence of the new law was that one became willing to appoint a professor especially for geology and mineralogy [20]. At Leiden the first professor to be appointed was Dr [J.] K. [L.] Martin (Royal Decree of September 10th, 1877, to take effect as of October 1st, 1877); he was appointed professor of geology and mineralogy. The Decree adds: including

palaeontology and crystallography; this was necessary as these sciences were not mentioned in the law. Some years earlier (1873? or 1874?) Martin visited Leiden to examine the glacial erratics in Staring's collection, which had been incorporated in RMNH. Of course, he had met Schlegel, and it was Schlegel who recommended Martin to the President of the Trustees (Easton, 1922, p. 17).

1878 - 1922

A professor having been appointed, once more Schlegel proposed the transferring of the geological and mineralogical collections to the professor's care. This proposal was supported by the Faculty of Science, by a Committee appointed to advise the Minister on a new building for RMNH (of which committee Verheijen was the chairman), and eventually by the Minister himself. Schlegel made one restriction, though. When the Minister inquired how RMNH's budget should be divided over the zoological and geological collections, Schlegel stated that there could be no question of allotting any part of the museum's funds to the professor of geology and mineralogy. His arguments were twofold: 1, in the past twenty years none of the museum's funds had been spent on the geological and mineralogical section, and 2, the funds were not even sufficient to cope with the needs of the section of vertebrate animals.

The proposals resulted in the Royal Decree of October 22nd, 1878, no. 20, by which, as from November 1st, 1878, Professor Dr H. Schlegel was relieved of the care of the geological and mineralogical collections belonging to the museum of natural history of Leiden University, and Professor Dr K. Martin [21] was entrusted with the care of the geological and mineralogical collections of the said museum. Thus, the geological and mineralogical section set its first step on the way to independence. Still, there was as yet no question of a complete separation.

Before discussing the further steps on the way to independence, some attention may be paid to Schlegel's part in this process. It is sometimes stated that Schlegel wanted to get rid of the geological collections as they caused dust and this was detrimental to the collection of birds (Gijzen, 1938, p. 70; Van der Vlerk, 1957, p. 71). Indeed the report by the Committee Verheijen (Verheijen, Cuypers & Hubrecht, 1878, p. 85; Gijzen, 1938, p. 40) states that Schlegel considered the geological and palaeontological collections a continuous cause of dust and this was one of the reasons not to unite the zoological with the geological and palaeontological collections. The report (p. 75) also states that on account of the dust, Schlegel did consider the uniting of zoological and palaeontological collections as detrimental to the first-named. However, it is interesting to note that neither in his annual reports, nor in his letters to the Trustees or to the Minister, Schlegel did ever complain of the dust caused by those collections. The only time that he complained of dust, this referred to dust caused by the activities of the carpenters, who through lack of an adequate workshop had to do some of their work in the galleries. Moreover, in his letter of February 25th, 1878, no. 23, Schlegel writes that the geological and mineralogical collections could remain in the rooms where they were housed at the time. Verheijen et al. (1878, p. 75) refer to the geological department, which also contains the palaeontological collections. As has been mentioned above (p. 46, 49) already, the collections of which Van Hoorn and Beima were in charge consisted only of

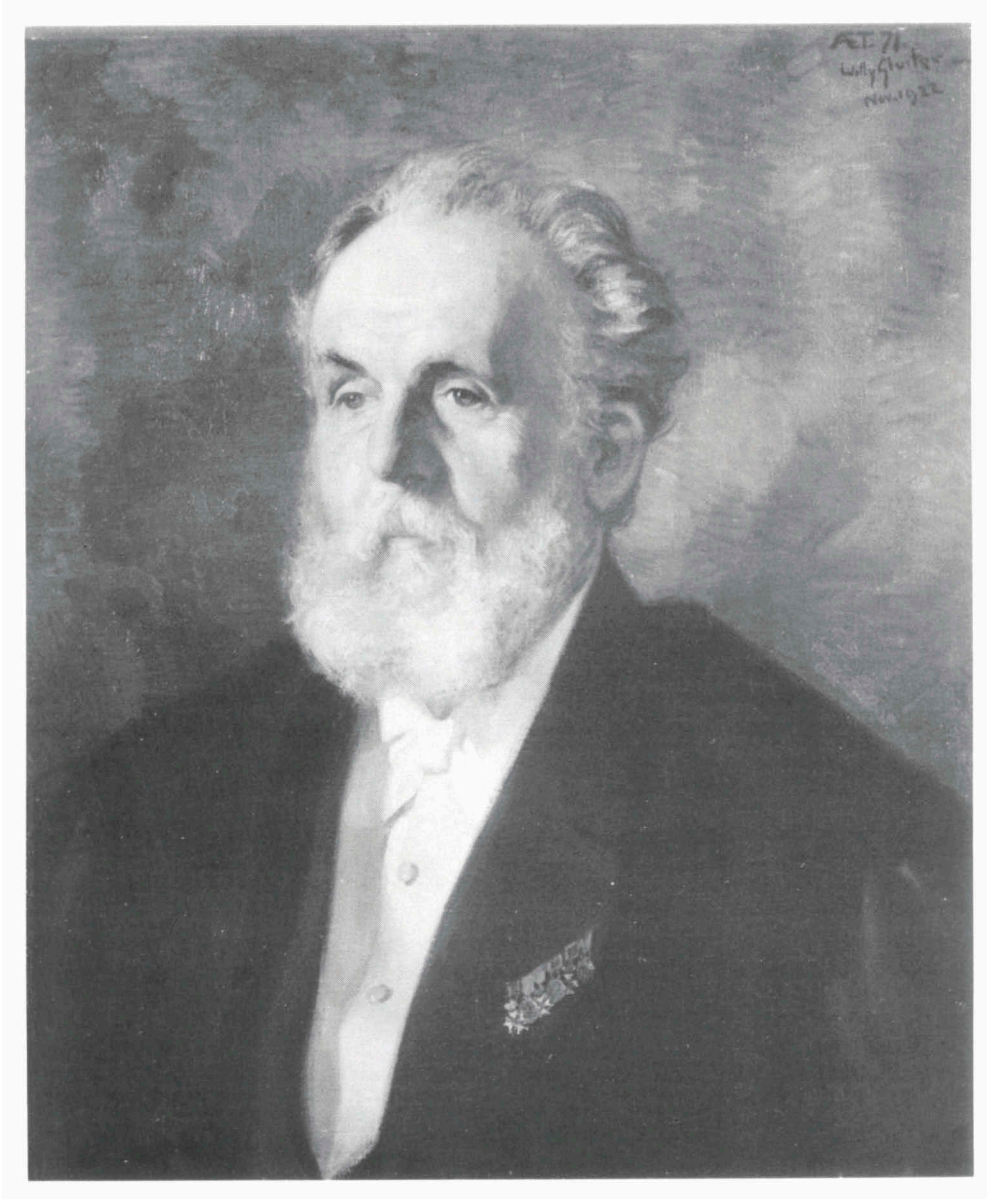

Fig. 7. Professor J. K. L. Martin, director, Geologisch-Mineralogisch Rijksmuseum, 1878 - 1922. Photograph by W. A. M. Devilé, RGM.

rock samples and minerals. In a petition to the Second Chamber of the States General, of October 5th, 1881, Martin refers to the geological and mineralogical collections, to which later were added those of palaeontology (which formerly were in the care of the curators of zoology). It may be that, when considering it unwise to combine zoological and palaeontological collections, Schlegel may have referred to housing recent and fossil invertebrates in the same storeroom.

The true reason for Schlegel urging the separation was, I believe, his strong preference for the collections of vertebrate animals [22]. These he considered more important than any other collections, and for these (in his opinion) the interests

of all other sections had to give way. Geologists often hold Schlegel in some contempt, because he did not further the cause of the geological collections, and there is no doubt about his being adverse of spending funds on the geological section. The lack of results from the fifty years, during which Van Hoorn and Beima were in charge, may also have influenced Schlegel. But, those who are in favour of an independent museum of geology and mineralogy, should not forget that, notwithstanding his shortcomings and some shortsightedness (or rather just through these qualities) it was Schlegel who set RGM on its way to independence.

As stated above the Royal Decree of October 22nd, 1878, did not yet bring about a complete separation. It is true that in February 1880, the Trustees did assign an allowance of 500 guilders to 'Geologie en Mineralogie', separately from the funds assigned to RMNH (7000 guilders), but from Martin's annual report, it is clear that this small sum was only meant to cover expenses of the chair, and not for expenses related to the collections. Later in the same year (12.X.1880), Martin sent in his report over the period mid-July 1879 to mid-July 1880; this was entitled: 'Verslag wegens de Geologisch-Mineralogische Verzamelingen aan 's Rijks Museum van Natuurlijke Historie te Leiden' (Report on the Geological-Mineralogical collections of the National Museum of Natural History, Leiden), and this he signed as 'De Directeur van 's Rijks Museum van Nat. Hist., afdeeling Geologie en Mineralogie' (The Director of the National Museum of Nat. Hist., department of Geology and Mineralogy). In this report he writes that a house adjoining RMNH had been rented, and that to this house had been moved all materials that had been kept in one of the storerooms of the department of zoology at the time the geological and mineralogical museum had not yet been separated as a distinct institute from RMNH. The next year (1880/1881) the report was entitled 'Verslag omtrent het Geologisch-Mineralogisch Rijks Museum te Leiden' (Report on the Geological-Mineralogical National Museum, Leiden); in it Martin states that RGM is now separated from RMNH, and that it is open to the public on Wednesday and Saturday afternoon; the passage is included in the paragraph on the building. Moreover, on January 6th and 12th, for the first time a list was published of collections and aids and appliances to the tuition at Leiden University (Staatscourant, no. 4, 6.I.1881: (3) and no. 9, 12.I.1881: (1)); in it the museum of natural history and the geological and mineralogical collections are mentioned separately. It is remarkable that news of the separation dit not reach the editors of the University's yearbook before the issue for the year 1882/1883 (p. 10); here the 'Geologisch Museum' is mentioned for the first time, be it with the note that it had been separated from RMNH since November 1878.

When Schlegel died (17.I.1884) a new director for RMNH had to be appointed. The Faculty of Sciences (of which Martin was a member) (in litt., 5.II, and 18.III.1884) considers the zoological and geological collections departments of one National Museum of Natural History, and they stress that they should remain so. The Trustees speak of an inexplicable error, as the geological collections had already been legitimally separated. Therefore, they did not agree with the Faculty's proposal to appoint the professor of zoology C. K. Hoffmann to be director of the zoological department and director in chief of RMNH; Martin then would remain director of RGM but as a department of RMNH s.l. As one of the Trustees mentioned in a marginal note: 'The one professor under the thumb of the other'. The senior curator of RMNH, Dr F. A. Jentink was appointed director of this museum. When Martin was absent for months (e.g.,

when he went to the West Indies) Jentink became acting director of RGM.

It always has been said that Schlegel wanted tot have the geological collections removed from the buildings of RMNH, but it was his successor, Dr F. A. Jentink, who stressed the necessity of removing RGM. On April 1st, 1889, a number of zoological specimens were destroyed when an overheated pipe from a stove in a room occupied by RGM caused a fire. The stove-pipe came from a room in which a student (J. L. G. Schröder van der Kolk) was working. As RGM was an institute in which teaching was done, and where one might expect students to do some work, it is amazing to note that the Minister inquired why working space had been given to a student. This fire helped to speed up the decision to provide RGM with a building of its own.

Eventually a new building was constructed for the geological and mineralogical collections; in 1892 the building was ready, and the collections could be moved. Some delay was caused by a shortage of shelves to store the samples, but in September 1895 the collections were stored and the public galleries were ready.

On September 19th, 1895, H. M. Queen Wilhelmina and H. M. Queen Emma, the Queen Regent, accompanied by H. R. H. the Princess Pauline of Würtemberg, were the first visitors to 's Rijks Geologisch-Mineralogisch Museum. It was not an official opening, but a visit based on the personal interest Queen Wilhelmina took in geology. For years already the Queen had been collecting geological specimens (Winter, n.d., pp. 95 - 96; Anonymus, 1970, pp. 13 - 14; Anderson, 1971, p. 122, 128). At first the Queen's teacher, Mr Gediking, and later Martin were the Queen's guides in the field of geology. Since 1964, Queen Wilhelmina's geological collection is on loan to RGM (Anonymus, 1970, p. 15; Anderson, 1971, p. 128).

On September 20th, 1895, the museum was opened to the public.

Although the name "s Rijks Geologisch-Mineralogisch Museum' was shown on a stone tablet over the entrance, even in 1904 Martin was not yet certain that he had the right to use this name, but he was soon reassured by an official from the Ministry. Martin (1938, p. 14) wrote that only when it had been moved to the new building, RGM became fully independent; until then it had been generally regarded a department of RMNH. Still, it seems to have been the intention to connect the building of RGM to the new building constructed for RMNH; at least this is mentioned in the University's yearbooks for the years 1916/17 to 1921/1922.

In the foregoing it has been sketched how the geological and mineralogical collection developed from a section of the National Museum of Natural History into a separate National Museum of Geology and Mineralogy. The sketch dealt only with problems of organisation and with the administrative aspects of the separation. However important these organisational changes were, they would have been of little use if they had not been accompanied by an increase in scientific activities and in teaching. To these aspects we may turn now.

Martin's teaching formed a relatively small part of his activities. Although the law of 1876 offered the possibility to obtain a doctor's degree in geology and one in mineralogy, there were hardly any students who took geology, or mineralogy, as a major subject, and most of Martin's teaching was to students in other fields, but who took geology as a minor, additional subject [23]. Some idea of the relative proportions of the educational and museum aspects respectively in

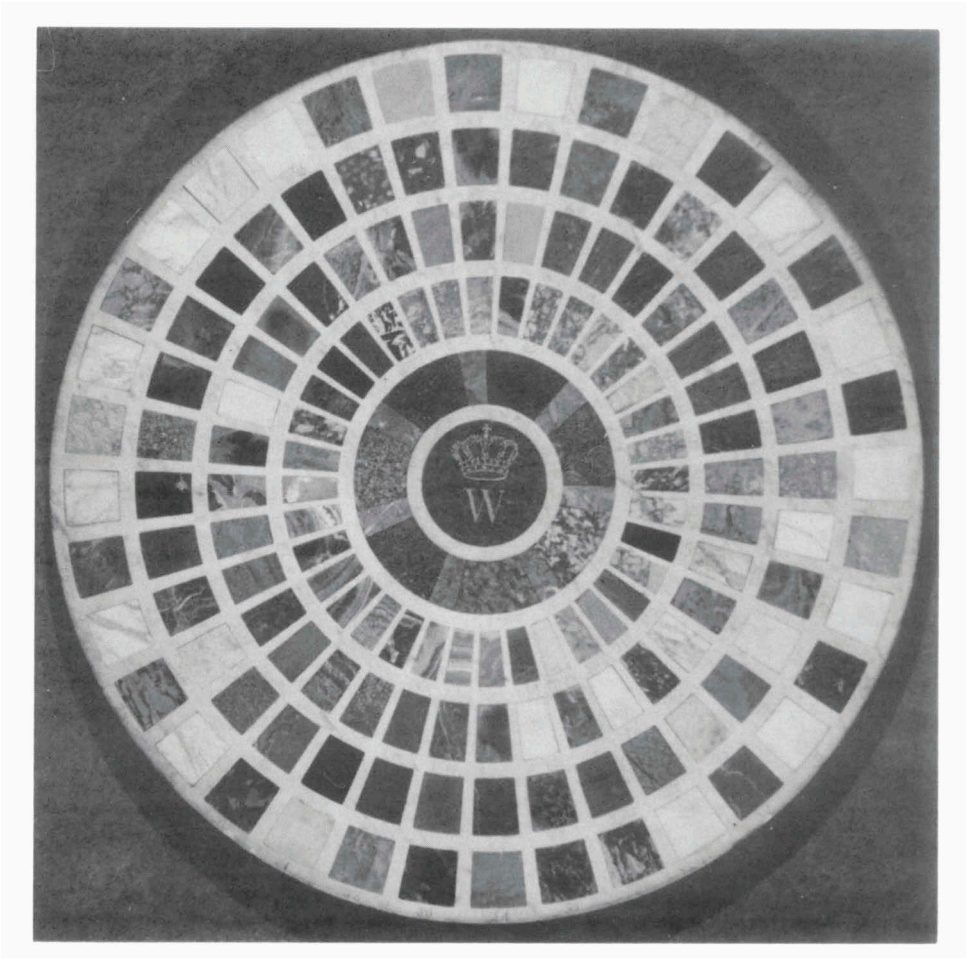

Fig. 8. Table-top consisting of (originally) 151 samples of marble (both recently quarried and from antiquities). Lt.-Col. J. E. Humbert, Engineers, Netherlands Army (* The Hague, 28.VII.1771 - † Leghorn, 20.I.1839) had this table made at Leghorn, Italy, in 1828/1829, after an example seen by him at Florence. Humbert was entrusted, by King Willem I, with the collecting of antiquities. At the time the table-top cost fl. 341.0.6, Netherlands currency. It was sent to the National Museum of Archeology, Leiden, which in 1904 passed it on to RGM. Photograph by W. A. M. Devilé, RGM.

Martin's tasks may be obtained from the space calculated for each of these when a new building was planned. In this building, to which RGM moved in 1892, about one-ninth part of the floor space was destined to teaching purposes, and nearly eight-ninths were for museum purposes. None the less Martin had to spend time on lectures and practical courses, but most of his time was available for scientific work.

Before Martin accepted full responsibility for the collections, he had had opportunity already to examine and to use them. His opinion was that the collections were of great value, but that they were in a sad state with regard to labeling and storage. Thus, he writes, one may find specimens of one and the same mineral put away in various places, instead of the specimens of one kind being stored together. This may have been a remnant from Van Hoorn's time when the minerals were arranged in two separate series (see p. 46).

Moreover, there were cases with collections that never had been unpacked. Martin estimated that he would need several years before he would have obtained an adequate survey of the contents of the collections, and until that time had been reached there would be little use in purchasing further specimens. This was the reason that in 1877 he did not ask for large funds, but that he only asked for cardboard boxes and for a cabinet to arrange the collections.

One of his first actions was to put together a collection for demonstration to the students, and that could be handled by these during practical courses. This collection was separated from the true museum collections. In this way the museum's numerous valuable and rare specimens were guarded from rough handling by inexperienced students. Thus the collections could be protected against damage, which had not been adequately done in the past (Martin's Report 1878/1879). It was a great advantage to Martin that he combined the functions of the director of the museum and of the only professor of geology in one person, for now he had to consult only with himself when deciding about the use of the collections, and thus the difficulties were avoided that often caused trouble between Schlegel and the professors of zoology.

Martin spent most of his time on scientific work connected with the museum's collections. In 1877 he stated that there was no order whatsoever in the arrangement and storing of the materials, and that it was of no use to acquire new materials until order had be restored [24]. He started with so much energy that already in 1878 and 1879 he published notes on specimens from the museum's collections, and new material was acquired. The subjects differed widely: diamonds (1878), phosphoritic limestone from the island of Bonaire (1879; material partly acquired in 1878), and the Tertiary fauna of Java. After these first papers a long series of publications appeared, and for this purpose Martin started a new serial publication, named 'Sammlungen des Geologischen Reichs-museums in Leiden' (1881 - 1922); this journal was published by E. J. Brill, publishers, of Leiden. Also, papers of his appeared in other journals. Martin treated a wide variety of subjects: erratics of Germany and the Netherlands, Pleistocene mammals of the Netherlands, geology of the Netherlands Antilles and Surinam, and a great number of papers dealt with the geology and palaeontology of the then Netherlands East Indies. Martin made one trip to the Netherlands Antilles and Surinam (1884/1885), and two trips to the East Indies (Moluccas, 1891/1892; Java, 1910); from these travels he brought extensive collections home. As usual, a museum that harbours a well-known specialist attracts materials, and thus many collections were sent to RGM. There are but few animal groups with which Martin did not deal in one way or another, but most famous he will remain for his studies on fossil molluscs of which he described more than 800 taxa.

Aside from the geological sciences, Martin had another field of interest: entomology, and especially Lepidoptera.

1922 - 1955

Having reached the age of seventy years (24.XI.1921), Martin had to retire, and he received his discharge as from September 18th, 1922 by Royal Decree of February 25th, 1922, no. 13. The same Decree appointed Dr B. G. Escher [25] to the chair of geology and mineralogy (including palaeontology and mineralogy) also as from September 18th, 1922.

Fig. 9. Professor B. G. Escher, director, Rijksmuseum van Geologie en Mineralogie, 1922 - 1955. Photograph by B. M. F. Collet, RGM.

Undoubtedly Escher showed interest in the museum, and often he furthered its causes, but his own research was in another field. Repeatedly he stated that primarily his task was to teach. When it came to dividing the limited funds he chose for tuition, rather than for typical museum activities. While Martin was not hampered in his work by large numbers of students, Escher attracted many pupils. The interest in geology was growing, inter alia with regard to the search for oil. In 1938 Escher (in litt., 27.X.1938) proudly stated that Leiden with more than 70 students had by far the largest geological school of Western Europe. A consequence of this development was that Dr H. Gerth, who had become the museum's curator in 1920, had to assist Escher in teaching, and this meant that no longer he could devote all his time to the collections. From the museum's point of view this was definitely a set-back. Still, the greater activities of the tuition department led to teacher and students doing field work and bringing home collections, part of which were passed to the museum. The change in policy (a stronger teaching element) also led to the 'Sammlungen' (the journal started by Martin in 1881) being replaced by 'Leidsche Geologische Mededeelingen' (from 1925 onwards), a journal that contained not only papers dealing with the museum's collections, but also papers on the research by teachers and students on other

subjects (e.g., on the results of geological mapping in preparation for doctor's theses).

The strong growth of the educational activities was hampered by a lack of space. The building had been constructed to house a museum, its staff and a very few students, and there was no space for a large staff, not for rooms for practical courses, nor for a laboratory for experimental sedimentological research (a subject that had Escher's interest). In 1930 a new wing was added which was ready in 1932; in this, most of the teaching department was housed.

In 1928 Gerth left the museum. He went to the Netherlands East Indies where he joined the Dienst voor het Mijnwezen (Mining Service, in fact: the geological survey of the East Indies). There he replaced Dr I. M. van der Vlerk, who came to Leiden, where he became curator. Again the curator's duties were mainly to teach. At first Van der Vlerk became a 'privaat docent' (unsalaried lecturer), but in 1931 he received the personal title of 'lector' (reader), on February 1st, 1938, he became professor extraordinarius, and on February 13th, 1947, professor ordinarius; in these functions he taught palaeontology and historical geology.

Although the name Rijksmuseum van Geologie en Mineralogie was maintained, the institution had changed from being primarily a scientific museum — in which some teaching was done — to a primarily educational institute — which also harboured a museum — but a museum without any staff especially appointed to take care of the collections. In January 1938, for the first time, Escher indicated that the institution consisted of two very different parts, for which he used the name museum, and the name 'institute' for the teaching department. This bipartite organisation became even more evident when later, in 1938, Escher perceived some criticism on his activities as a museum director. On July 28th, 1938, ninety-six precious stones (many of these from the collection donated in 1815 by King Willem I) were stolen from the public gallery. The enquiries by the Trustees about (the lack of) measures taken for the security of the collections, made Escher aware of the fact that as the director of the museum he might be held responsible for the exhibits and their safety. On the principle that attack is the best defense, Escher put the blame on the government that did not provide sufficient funds for the museum (not even for the registration of specimens). He suggested that one should appoint a director especially for the museum, but in the end everything remained as it was before [26].

In May 1940, the Netherlands were occupied by the German armies, and some Jewish professors were dismissed, there were protests against this, and the university was closed (November 27th, 1940). More and more attempts were made to infiltrate the universities with nazi principles and — as the situation became worse — many professors of Leiden University resigned (June 1942). Among these were Escher and Van der Vlerk; other members of the University personnel went as well. On January 1st, 1943, the war-time authorities appointed Professor H. Gerth acting director. Gerth, of German nationality, had been the museum's curator under Martin and Escher (1920 - 1928), and since the end of 1929 he was professor of palaeontology at Amsterdam Municipal University. To assist him a new scientific assistent (Dr W. F. H. Kimpe) was appointed. When towards the end of the war the railway services were suspended, neither Gerth, nor his assistant could reach the museum, and when the connections were restored after the liberation of the country, Gerth and the assistant did not return to Leiden. Escher, Van der Vlerk, and other members of the staff returned to the museum

and were re-appointed. A. Brouwer, who was an assistant in 1941, became a curator of the museum as from January 1st, 1946, and thus the museum once more had a curator who was especially entrusted with the care of the collections.

The teaching staff grew fairly rapidly, but the staff for the museum activities grew much slower, and more and more the museum proper became dominated by the teaching departments. In the years 1952 to 1955 repeatedly the position of the museum and its organisation were discussed. The curator Dr A. Brouwer produced a document, which he presented to the Trustees (30.V.1952). In this he pleaded for a separation of the museum proper from the teaching section, which like Escher in 1938 he called 'institute'. These two institutions having become independent might cooperate together much better then when such a cooperation was forced upon them, and when one partner dominated the other. It might be feasible to have a director for the two together, but then the museum should have one member of the staff who was to be responsible for the daily course of affairs, and whose sole duty would be the care of the museum. Escher who in 1938 had advocated a similar separation and the appointing of a director especially for the museum, now strongly opposed Brouwer's views. He would not even consider the nomination of a deputy director for the museum; such a functionary would aim only at independence from the professors, etc. Confusion was caused by Escher's use of the term 'institute'. In 1938 (like Brouwer in 1952) he used 'institute' specifically for the teaching section, but now he claimed that Leiden did have a Geological Institute, which consisted of two sections: RGM (the museum proper) and the Geological Laboratory (the teaching section, i.e., the institute meant by Brouwer). It is remarkable that Escher claimed RGM to be the central, national museum of geology, whilst at the same time considering it a section of the University's Geological Institute, for this is obviously not compatible with the status of a national museum. Others voiced their opinion in subsequent years, and it was suggested that the three full professors (Escher, Van der Vlerk, E. Niggli) should take turns as director of the museum. Luckily nothing came of this; the lack of continuity in policy would have been detrimental to the museum.

During Escher's directorate, the staff of the museum grew from one curator in 1922 (and a period of no curator specifically for the collections until 1946), to (1954) three curators (one for mineralogy and petrology; two for palaeontology and historical geology), and one assistant (mineralogy and petrology).

The collections grew steadily. One of the subjects in which Escher was interested was mineralogy, and this interest was definitely beneficial to the collections. The exhibits in the public gallery were modernized, and one of the welcome additions was a showcase in which the fluorescent minerals were demonstrated. Van der Vlerk had not only an interest in Foraminifera and in the stratigraphy of Tertiary deposits in the East Indies, but also in the Pleistocene of the Netherlands, and he greatly stimulated research in the last-named subject. It is difficult to discern between the scientific activities of the museum proper and the teaching department. Much of the mineralogical and palaeontological research by members of the tuition department will still have been based on its collections, and materials collected by students were incorporated in the museum.

Escher's great interest in mineralogy led in 1936 to the establishing of the 'Stichting Nederlandsch Instituut voor Wetenschappelijk Onderzoek van Edelstenen en Paarlen' (Foundation Netherlands Institute for Scientific Research on Gems and Pearls), which was founded by the University and the Government

together with representants of the jeweller's trade. The laboratory of this foundation, with Mr J. Bolman as its director, was housed in RGM. During the war (for as long as he could travel to Leiden) Bolman remained in charge of the foundation's laboratory. He did not return after the war, and on December 22nd, 1947, he retired for reasons of health and age (he had reached the age of 65 already). In a letter of December 13th, 1950, Escher wrote that the foundation would have to be liquidated, but that this had to be decided by a meeting of the board which could not take place before the second half of January 1951 (this in answer to a question by the postal authorities whether the foundation's account should be continued). When exactly the liquidation took place is not clear. However, in 1957 a new foundation came into being (see note 33).

1955 - 1961

On September 19th, 1955 Escher retired; he was succeeded by Professor A. J. Pannekoek; the petrologist, Professor E. Niggli, also left, accepting the chair of petrology at Berne (Switzerland), and was replaced by Professor W. P. de Roever. It was decided that the museum proper and the institute each would have its own director. Van der Vlerk [27] became director of RGM, but at first he also was in charge of the Institute's department of palaeontology and for a time of the Institute as a whole.

The new wing of 1930 may have given some relief as far as space was concerned, and the incorporation of the rooms in which the museum's caretaker used to live, may have given some further relief, but this was only temporarily. The collections and the staff grew, but even more important was the growth of the staff and the numbers of students in the Institute, and the museum had to cede more and more space. In the end, part of the collections had to be stored in the corridors all over the building. This made it rather difficult to obtain a complete picture of the museum's collections, it hampered research, and it diminished safety. Already in 1954, Escher (together with the Trustees) had considered plans to try and obtain the building of an adjoining school (belonging to the municipality) and to reconstruct this for the museum, but this was not to succeed in a short time. Another possibility cropped up. An old orphanage, the 'Heilige Geest of Arme Wees- en Kinderhuis' (the Holy Spirit Poor Orphans and Childrens' Home), the building being of the 17th and 18th century, came up for sale. Van der Vlerk devoted Christmas 1956 to write a report on this matter. He strongly advised to buy the buildings of the orphanage and to transfer RGM to it. This would not only solve the problem of space, but it also would give the museum the independence it needed. Van der Vlerk left no doubt about it, that the combination of museum and institute — such as it had been in the past — had been detrimental to RGM and its development. It took a long time before the plans could be realised. At first the Minister of Finance opposed to making so many costs for the museum. The plans were only approved of, after the Trustees had stated that they were made primarily to create more room for the Institute, which with the limited space allotted to it, could not adequately perform its teaching duties for the large number of students that had to attend lectures and practical courses. That the museum and its collections were suffering from lack of space (which was a threat to the safety of the materials and a serious handicap to research) was considered just a minor

Fig. 10. Professor I. M. van der Vlerk, director, Rijksmuseum van Geologie en Mineralogie, 1955 - 1961. Photograph by B. M. F. Collet, RGM.

argument. Under the circumstances it is understandable that Van der Vlerk (in litt., 2.I.1957) stated that it had not been to the benefit of the museum that for so long a time it had shared with the Institute one director and had been housed under the same roof. In 1959 the buildings of the orphanage were acquired; part of them had to be rented to E. J. Brill, publishers and printers, part were houses rented to private persons, and part of it was to house the museum. It proved that the buildings were in a poor condition, so extensive and very costly repairs were necessary; these took several years. The plans were also the subject of a report by Professor A. J. Pannekoek, written on behalf of the University's subfaculty of geology. From this it transpired once more that the subfaculty considered the museum a convenient store room, the collections of which might be used for practical work by students. It is the same point of view that often before had been expressed by the teaching departments, and that inter alia had been the cause of conflicts between the directors of RMNH and the zoology professors.

1961 - 1972

When Van der Vlerk became the museum's director in 1955, the staff consisted of three curators; when Van der Vlerk left in 1961 there were five curators. During Van der Vlerk's directorate the activities were manifold. The annual reports mention many field trips to collect materials, during which much attention was paid to the Netherlands; scientific meetings and congresses were attended, and lectures for the general public were given. Re-arrangements were made in the public galleries, inter alia, by providing more space for collections from the Netherlands, and reducing the exhibits from overseas areas.

Van der Vlerk did not stay in office until the museum could be moved. At the age of 69 years he retired as from February 1st, 1961. The curator, Dr P. C. Zwaan, took charge as acting director until October 1st, 1963.

As the removal was expected to take place very soon, preparations were started. As far as possible, the specimens were packed in compact units that would be easy to transport and stow. There was one drawback to this, the compact storage made the collections less accessible, a situation that was felt the more as it became clear that the collections would be moved much later than at first believed.

In the meantime a new director had to be appointed, and this time it would not just be Van der Vlerk's successor to the chair of palaeontology. A committee was appointed to advise the Faculty of Sciences, which had to send a recommendation for the nomination to the Trustees, and it is clear that the future position of RGM was an important factor to be considered. Two of the committee's members (Professor A. Brouwer, the new professor of palaeontology, and L. D. Brongersma, then director of RMNH) suggested that RMNH and RGM should be united again. The result would be a national museum of natural history with two departments: one of zoology, and one of geology and mineralogy. Each department should have its own director, and the whole would be in charge of a director in chief, an organisation that reminds inter alia of the British Museum (Natural History) with a director and with keepers in charge of the departments. After some discussion this proposal was not adopted, the geologists in the committee believing that a separate geological museum would have more of a status than a department of a more general museum. Besides, it was felt as a difficulty that there was as yet no possibility to house the two departments in one building. Still, a uniting of RMNH and RGM at a later date was not excluded.

As from October 1st, 1963, Dr C. Beets [28] was appointed director of RGM. With energy he started on the task he had imposed upon himself, viz., to restore to RGM the position and the status it should have in the Netherlands. In the past decades, as a section of the University's Geological Institute, RGM was only a national museum by name, and Beets aimed at its becoming truly the national museum of geology and mineralogy, and this implied that it also should be a centre of research. The moving of RGM (in 1966) to a separate building, and its having a director especially for the museum, who was not hampered by teaching duties, offered new possibilities. Experience shows that a newly appointed director will find a ready ear for his proposals. One of the conditions for success was a drastic increase in staff, and in eight years (1963 - 1971) the staff was increased from five curators to fourteen (in the grades comparable to scientific officer to senior principal scientific officer). Moreover, three staff members (entrusted with research) were appointed in technical grades. Thus in these eight

years the staff had more than trebled. There were drawbacks to this very rapid growth. Most of the newly appointed curators, though promising scientists, had not received any training in a museum, and as it proved later, some of them were not aware of the responsibility they were to have with regard to the care of the collections. Besides, to work efficaciously a curator needs assistance, e.g., in the labeling and registration of the samples, in storing materials, in preparing thin sections of rock samples, preparing samples for palynological research, or in developing fossils from the matrix. The growth of the technical staff did not keep step with that of the scientific staff, and very soon this made itself felt; even more so when it became clear that a further expansion of the staff would not be allowed. The scientific staff had to help moving the collections and to do other menial duties, and though it is commendable that they did not shirk this kind of work, it hampered the work they should have done. Curators (e.g., a petrologist-mineralogist, a palynologist) had been appointed who needed laboratories for their work, but there were (and are still) no such laboratories in the building. There were other problems of space as well. Rooms had to be found for new staff members, and their activities brought along a rapid growth of the collections. When Van der Vlerk in 1957 made plans for moving RGM to its present buildings, apparently he had not foreseen such a growth.

There proved to be other snags. In Martin's time a library had been formed, especially for the museum. The 'Sammlungen' were used as materials of exchange with other museums. In Escher's time the library grew, and literature was acquired not only for the museum, but also for sections of the Geological Institute. When the museum and institute were housed in one building this did not cause any trouble, but when the museum left the building, Beets claimed, of course, the literature that was needed for the museum, a request not appreciated by the Institute. Eventually a committee of staff members of RGM and Institute, together with the Librarian of the University's (General) Library developed an arrangement about the dividing of the library over RGM and Institute. Such a division was acceptable as both resulting libraries would be available at Leiden to the staff of both institutions. Problems also arose over the budget, etc., and it will be clear that some friction was caused over such matters.

Of course, RGM was happy to move into buildings of its own, but within ten years it became evident that, restored though it may be, an old orphanage is not an ideal building to house geological collections, heavy as they are. In the ground floor storerooms pillars had to be placed to support the joisting of the first floor. Originally it was planned to store most of the collections on the ground floor in boxes in movable racks, as this would save floor space. However, it proved that even then there would be not enough space. The storerooms being high of pitch, one decided to have a second layer of racks with an additional (perforated metal) floor added. This meant, of course, that the idea of having movable racks had to be abandoned, and the gain in space had to remain limited. Part of the space intended for housing the public galleries, had after all to be used for a storeroom of vertebrates and molluscs. Some rooms in which exhibits were to be installed on the second floor proved to need extra support of the joisting to allow them to be opened to the public. To-day one can only conclude that the space in the present buildings is totally inadequate. The rooms of the staff are often too small, too low of ceiling, and the necessary space for laboratories, e.g., for the departments of mineralogy and palynology is lacking. This distinctly hampers the staff's research. Making available laboratories in other institutes,

at a distance from the museum, can be only a temporary solution. The present author fears that, if such a solution would be extended over long years it will tend to break up the museum in widely separated units, it may alienate curators, and this would be detrimental to the unity of RGM and its staff.

A variety of activities have been started by the staff, and new subjects were broached. Field work plays an important part in the museum's research, both in the Netherlands and abroad (e.g. in Belgium, Germany, Italy, and Spain). Staff members take part in, and often give assistance to excursions organized by others. A survey of the staff will be given at the end of the present review, and the subjects dealt with by each of them will give an impression of the scope of the museum's scientific activities.

One subject may be mentioned here, viz., the registration of the museum's collections by aid of a computer. In 1971, Dr J. H. Germeraad joined the museum, inter alia, to develop methods of computerized registration. As far as the registration of the collections was concerned, this task was taken over fairly soon by Dr M. Freudenthal, and under his guidance this registration is now progressing well (Freudenthal, 1975). A drawback is that due to the lack of assistance, senior curators are now performing tasks that should have fallen to other personnel, e.g., to typists trained for this kind of work. The time spent by curators on this work badly hampers research, which is still one of the most important elements of a curator's duties.

If the computerization is based on a programme also adopted by other museums, thus facilitating an exchange of data, this will make it easier to trace the whereabouts of materials needed for research, and in the end much time will be saved in this way. However, and this is the present writer's firm conviction, computerized registration can and should not completely replace the register every museum should have, containing full data regarding each object, its history, possible changes of identification, reference to publications, etc. If the punchcards are to be prepared by specially trained typists, the typists will have to be provided with the necessary data in writing; a well-kept register would thus provide the basis for computerization.

At a time it has been suggested that computerized registration will make it possible to save space in storing collections. Instead of a strictly systematical arrangement of the objects, which necessitates keeping open spaces to insert additional items, one could apply compact storage in which the objects, or larger or smaller collections of related objects, would be stored irrespective of subjects. This might indeed save space, but the result would be that objects and collections dealing with one and the same subject would become scattered through the storerooms. It is true that by using the computer one may ascertain where the specimens are stored, and one can ask a storeroom attendant to get the specimens out and to put them back. However, curators who are responsible for certain sections of the museum's collections will find it difficult to perform their curatorial duties if the materials of their section are widely scattered over the storerooms. Another objection is that 'browsing' in the collections becomes impossible, but chance finds in collections, or chance observations, often have been the inspiration for many interesting studies. A computerized catalogue (or a card file) will yield only that what has been put into it, but browsing will turn up much information that cannot be found in another way. Often also, a curator will need to make a rapid comparison of an object to specimens previously identified, and this can be done efficiently only if related objects are grouped together and

are easily accessible. In any case the collections belonging to one section, under the supervision of one curator should be stored together.

I know that it will be objected that there will be slabs of stone that contain fossils of various kinds and which, therefore, cannot be placed in any single section, but this may not be a reason to abandon the storage according to general subjects (and within these according to a more detailed classification). In such cases computerization (or card files) may help to locate the specimens.

The idea of a strictly applied compact storage has not been introduced in RGM, but the above remarks have been made to indicate the dangers of such projects. Computerization is important and it can become a true help to trace museum objects throughout the world, but one should beware of overrating and misusing it.

On November 14th, 1972, at his request, leave of absence was granted to Dr C. Beets, and as from May 1st, 1977, he resigned from his post as director of RGM. However, he did not leave the University's service. He resumed and continued his studies on Tertiary molluscs, which he did have to interrupt during the past years. To this purpose RMNH offered him hospitality.

The Present (from 1972 onwards)

Since November 15th, 1972, RGM has been in the care of successive acting directors, viz. Dr G. L. Krol (November 15th - December 20th, 1972), Prof. L. D. Brongersma (December 21st, 1972 - November 1st, 1976), and Dr, now Professor, P. C. Zwaan (since November 1st, 1976).

In the recent past RGM had come to find itself in a somewhat isolated position, but gradually contacts with other institutions were renewed and intensified. The Royal Netherlands Academy of Sciences appointed Dr H. J. W. G. Schalke a member of its Committee for the Geological Sciences (October 1973), and since 1976 he is the Committee's Secretary; he is also the secretary of the Academy's Inqua Committee. The Minister for Culture, Recreation and Social Welfare appointed Dr C. E. S. Arps a member of the committee that advises him, inter alia, on the subventions to the natural history museums that are not owned by the State. Both these memberships are of value to RGM's contacts with other geological institutions, and natural history museums; also they help to keep RGM informed about developments in the world of geology. Contacts with the Geological Survey of the Netherlands offer promising possibilities for cooperation. Leiden harbours about 15 museums, and in the past these had hardly any contact. To-day, the directors of the three most closely related institutions (RMNH, RGM, National Herbarium) have monthly meetings to discuss matters of common interest. There is also more contact with other museums. To facilitate cooperation destined to promote the public to visit museums, to organize tours connected with competitions, to plead for common causes, the 'Stichting Leiden Museumstad' (Foundation Leiden, Town of Museums) came into being, in which all the museums of Leiden are represented; Mr P. P. Takken, Head of RGM's Central Services, is secretary of this foundation.

One of the tasks of a museum is to have galleries where the public can see some of the museum's contents. RGM always has had exhibits; those in the

buildings occupied from 1892 to 1966 were more elaborate than those shown before that time. The exhibition was a permanent one, but in the course of the years changes were made from time to time. After RGM had moved to its present buildings (1966), the Trustees of the University urged the opening of the public galleries, but so much time was required to arrange the collections in the storerooms, that there was but little time to spare for preparing exhibits. Still, after much hard work the first gallery could be opened to the public in January 1969, and in the following years other galleries were opened, but by 1972 this task had not yet been completed. Moreover, the arrangement in the galleries open to the public was considered to be but provisional.

In the gallery of minerals, a cubicle had been constructed for the exhibit of luminescent minerals. It seems that the builders considered ultra-violet light very dangerous, for they made the walls of this cubicle of double layers of bricks. The about sixteen tons of weight of this cubicle was more than the floor could stand. Before any accidents could happen the cubicle was removed. What at first seemed to be a disaster, after all proved to be a boon. The gallery had to be changed, and this gave us the possibility to prepare a modernized exhibition. The specimens to be shown were selected by the curator in charge of the collections, but the lay-out was entrusted to one of the museum's artists, Mr B. F. M. Collet; the technical staff designed special showcases, etc. The result was a colourful gallery in which the public gets an idea of the great variety in shape and colour of minerals, and where many visitors are impressed by the beauty of these. In a new cubicle (but this time of light weight) the luminescence of minerals is shown, and a series of slides with a spoken text (to be set in operation by the visitor) gives information about minerals. Though a few curators may think this way of presenting museum specimens too frivolous, the general public greatly appreciate this new presentation. Once started in this way, plans for new arrangements of other galleries were initiated. Recently a gallery showing the geological processes that affect the surface of the earth was opened. This time it was another artist, Mr J. Timmers, who took care of the lay-out and who also built a diorama to illustrate the outcome of these processes. Again the technical staff gave full assistance. It is a pleasure to see the enthusiasm with which these tasks are performed. A small hall is reserved for occasional, temporary exhibitions dealing with a special subject.

While ten years ago the majority of the visitors came singly or in small groups (e.g., parents with children), to-day visits by larger groups (e.g., by school classes) have become an important feature. It also proved that conducted tours do attract visitors. With Dr H. J. W. G. Schalke as the driving power of this service to the public, a group of curators made themselves repeatedly available to conduct groups through the galleries. Willing though the staff was, it became clear that it would be impossible to satisfy the demand, for curators have other duties and it does not do to interrupt their work on the collections and their scientific studies too often and at short notice. The solution was, of course, to have a special educational department to cope with these activities. Since September 1st, 1976, RGM is lucky to have a competent geologist Miss E. van der Wilk, who has experience in research, but also in teaching in elementary and secondary schools, to perform these duties. Besides tours through the galleries afternoons are organized for groups of young people, where they do not just look at exhibits, but are also allowed to handle geological materials. These afternoon sessions have become a great success. In winter, lectures are organized in the

evenings, and a society of amateur geologists uses the museum's lecture hall for its meetings. And so RGM is on its way to fulfill completely (and successfully) its task as an educational institute for the general public.

The Future

At this point a survey of the tasks of RGM may be inserted, such as the present author considers these to be. One has to distinguish clearly between the true or main task of the museum, and all kinds of side-line activities (additional duties), which are connected to the main task in some way, but which can only be carried out if they do not impede or seriously hamper the execution of the main task.

The main task is threefold:

1. The bringing together and maintaining of collections (inter alia, to serve as 'archives') relating to the geological sciences and their subsciences (such as general geology, palaeontology, petrology, mineralogy, sedimentology, volcanology, palynology). The concept 'collections' must be taken in a wide sense; it should not be restricted to samples of minerals and rocks, to fossil remains of animals and plants, etc., but it should also cover collections of data (descriptions, drawings, photographs) published or unpublished, manuscripts, maps, models, casts, lacquer-profiles, films, slides, etc.).
2. Research in the whole scope of geological sciences, in the first place based upon the museum's collections mentioned above, but it should not be restricted to these; field work to collect materials and data, and the publishing of the results of scientific studies also come under this heading.
3. An educational task with regard to the public, providing information relating to the geological sciences, their importance to the community (be it economical, or with regard to conservation of sites of geological interest, landscapes, etc.). To this purpose the museum must have public galleries with a more or less permanent exhibition, as well as temporary exhibits in its own buildings or elsewhere; lectures may be given, films shown, and courses may be organized in which the public can take part actively; further, publications on a popular scientific basis should be issued. In so far as feasible specimens should be identified, and information given to members of the public individually.

This sequence of the three parts of the main task has deliberately been chosen, as each part forms the basis for the next. Although one can bring together collections just for the satisfaction of possession, as an investment or as a token of prosperity and of personal importance (such as was often done by wealthy people in the 18th century), from a scientific point of view this kind of collecting is senseless. A scientific museum brings together its collections to serve as a basis for research, and partly also for visual instruction to the public. Thus, the research done in a museum arises in the first place from its collections. Publication of the results is necessary to inform other scientists about the progress made, and to enable them to proceed from there. The presence of collections and the knowledge obtained form the base for the educational task. However, there is also a back coupling from the one task element to the other. Inquiries by the general public, as well as by other scientists, or companies, may lead to further

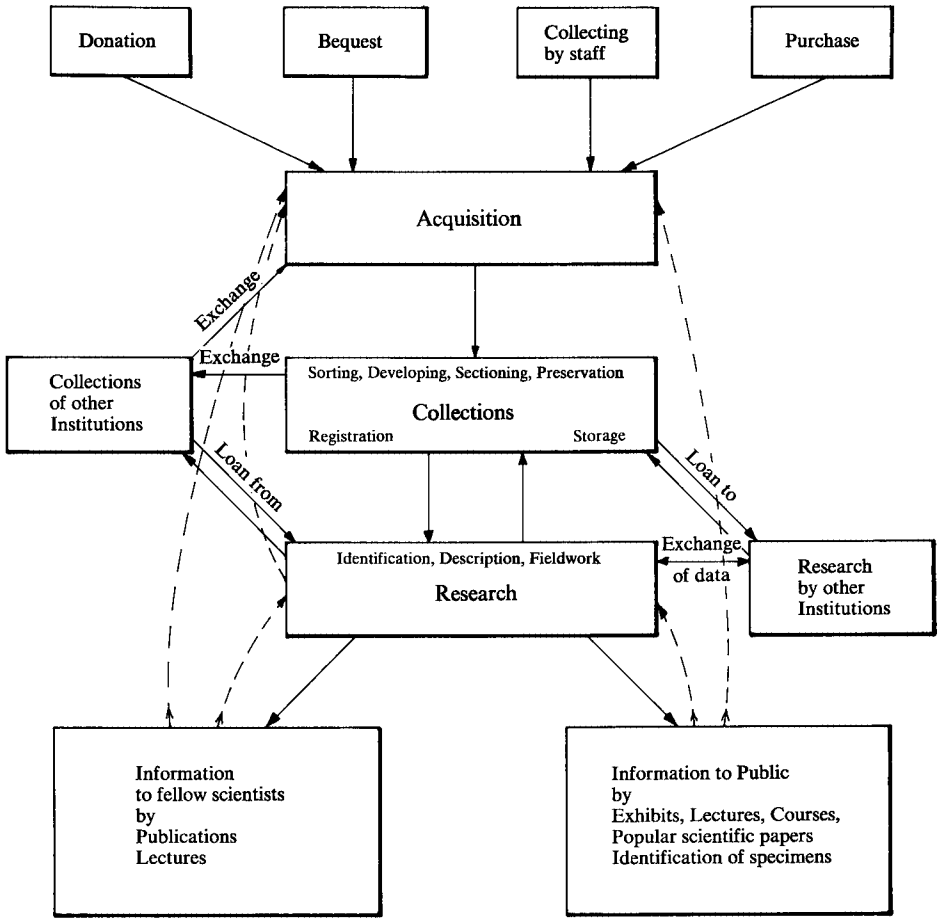

Fig. 11. Diagram showing the interrelationships of the various parts of RGM's activities; the broken lines indicate back-coupling. The arrows point to activities stimulated in this way.

research, and this in its turn may necessitate the acquiring of materials. Also, the answering of inquiries may bring about donations to the museum's collections.

It must never be forgotten that the collections were brought together often at the cost of much energy, at personal hardships, and sometimes through great financial efforts. The collector (whether he donated the specimens, or whether he sold them), and those who donated or bequeathed materials must be assured that the collections will always receive the necessary care. Methods in research, ideas and opinions change continually, and often a specimen or a sample in a collection will be the only link with the past that enables us to relate observations and opinions of the past to the knowledge of today. An object with but scanty documentation about its origin (locality, horizon, etc.) may perhaps be refused when offered to-day, but if it has been in the collections for a very long time it should not be discarded. This is one of the aspects of the museum serving as scientific archives. The museum and its staff thus have a great responsibility not only to collectors, donors, and testators, but also to the community that bears the costs of maintaining the museum.

The additional activities are of all kinds, but they all are concerned with rendering service to others. Some examples may be given here.

1. Scientific service to other institutions (museums, university institutes, geological surveys), to trade and industry, to amateur geologists, and to members of the general public, e.g., by identifying minerals, rock samples, and fossils, by assisting in the dating of strata, by giving information about interesting sites, or by information on developing specimens from the matrix and on methods of preservation, etc.
2. Assisting other institutions or societies to organize exhibitions by providing materials, by giving assistance in the lay-out, or by technical assistance in building up exhibits.
3. The housing of the 'Nederlands Edelsteen Laboratorium' (Netherlands Gem Laboratory), the laboratoy of the Foundation Nederlands Instituut voor Wetenschappelijk Onderzoek van Edelstenen en Paarlen (Netherlands Institute for Scientific Research on Gems and Pearls). The part that members of the RGM staff take in the activities of this laboratory also comes under this heading.
4. Cooperation with associations and societies in the field of the geological sciences, inter alia, by providing facilities for meetings, and by offering hospitality to the Gemmological Association of Great Britain for those of its examinations as take place in the Netherlands.
5. Teaching in the geological sciences, be it at University level, or otherwise. This subject needs special attention, and it will be discussed below.

UNIVERSITY TEACHING

Teaching at the University does not form part of the main task of RGM. This point must be stressed emphatically, because in University circles one used to think (and sometimes does still think) otherwise. It has been suggested that the museum's collections are there to be used by students. However, anyone, who has had to deal with practical courses, knows from experience that materials handled repeatedly by students soon deteriorate. It may be remembered that, as soon as he took over the collections, Martin separated a small collection for teaching purposes from the main collection that was too valuable to be handled by students (see p. 57). It is a regrettable fact that students do get but little training, if any, in the way museum collections should be handled, and the consequence is that objects will be damaged, labels misplaced, etc. The collections have been made for scientific research, they contain the 'documents' upon which conclusions, hypotheses, and theories have been founded, and they must be preserved for future reference. They cannot be entrusted to people who have not been trained to handle them (be it students or teachers).

Although the Museum is not a teaching institution, this does not mean that it cannot (or will not) contribute at all to the training of advanced students, who do wish to specialize in some part of the geological sciences, under the guidance of the museum's staff. This would apply to students that have passed their 'candidaatsexamen' (more or less comparable to B.Sc.), and to those who, having passed the 'doctoraal examen' (comparable to M.Sc), want to prepare a thesis for the doctor's degree. That a cooperation between a national museum and the University is possible is shown by that between RMNH and the Section of Systematic Zoology and Evolutionary Biology of Leiden University. In fact some

cooperation between RGM and teaching institutions does already take place [29]. However, the cooperation will be subject to some conditions being met. In the first place it must be clear that RGM does not form part of the Subfaculty of Geology, nor of the Faculty of Sciences of Leiden University (nor of any other University). In the past, like this was the case with RMNH, RGM has often suffered from attempts by University staff to dictate the way the Museum should be run and how the collections should be used. When funds are scarce, they are used in the first place for teaching activities, and not much is left for the museum proper.

Once RGM has become independent, nothing would be any longer in the way of a cooperation with the Geological Institute, and this was also the tenor of Dr A. Brouwer's memorandum on the task, administration, and future development of RGM (May 30th, 1952). In the present author's opinion this independence would mean: complete separation of RGM from the Subfaculty and Faculty (preferably also from the University as such) as regards administration, funds, staff, and housing; furthermore that RGM would have the laboratories and workshops with all the equipment needed, all of its own, and not shared wholly or partly with the Geological Institute, for that would only cause new frictions; although RGM and the Geological Institute might be housed close together, each of them must have its own buildings. Arrangements should be made to transfer to RGM that part of the library that refers to subjects not specifically dealt with in the Institute. Also arrangements should be made about the regular transfer of collections to the museum, to prevent the university institutes setting up extensive collections, which might develop into new museums.

The cooperation in training students is on a voluntary basis, and this applies especially to the part the museum's curators have to play in it. There will be curators who do like to have a student working in their section, and who prove to be good teachers, but there will also be staff members who are excellent curators and scientists but who are not at all interested in teaching. One should not try and force the last-named curators to coach students. Besides, the primary task of the curators is to take care of the collections and study these; therefore, teaching activities will have to remain rather limited, so as not to encroach too much on the curatorial duties. Thus, the museum will never have the possibility to admit large numbers of students, and one should only accept students who are truly interested in the kind of research done in the museum (and not students who come to the museum because they consider other subjects even less interesting or more tiresome). It will be up to the director of RGM to decide how many and which students will be admitted. The students who want to use the collections will have to do so in the museum, under the supervision of the curator who is responsible for those collections; the responsibility for the tuition part (e.g., examinations) will fall to the university teachers (professors, readers, etc.). It may seem that too many restrictions are made, and that under such circumstances nothing much will come of the cooperation, but experience obtained by RMNH proves that the system works very well; good arrangements and clearly formulated agreements made beforehand can avoid unnecessary frictions.

There is one more possibility by which RGM can assist in teaching, viz., to give one or two members of RGM's staff a part-time task in the University, be it as a professor extraordinarius, or as a reader. This is quite possible if the teaching does take up but a small part of their time. In fact it would be a definite advantage if the authorities, under the competence of which the national museums

are placed, would be given the right to establish special chairs in subjects studied by the museum, and to be held by the directors. If the existing act dealing with the teaching at universities cannot be changed to this purpose, one could establish a foundation to arrange these matters, or one might try and do this through the intermediary of the 'Leids Universiteits Fonds' (foundation Leiden University Fund). This foundation recently established a special chair in gemmology, which is held by Dr P. C. Zwaan, mineralogist of RGM, director of the Netherlands Gem Laboratory, and presently acting director of RGM.

OTHER TEACHING ACTIVITIES

Assistance can be given to non-universitary teaching, e.g., to pupils who are training to become museum assistants, and who wish to get some practice in registration and arranging of collections, preparing exhibits, etc. The possibility has been considered of giving introductory lessons at elementary and secondary schools, preparatory to a visit to the museum; it is here that the museum's educational task may merge into teaching.

Members of RGM's staff may lecture and may arrange for practical work that form part of the courses organized by the Netherlands Institute for Scientific Research on Gems and Pearls. These courses are preparatory to the examinations of the Gemmological Association of Great Britain, which in the Netherlands are supervised by the RGM mineralogists; the examination papers are received from London, and the answers are judged in London. Moreover, as gemmologists, Prof. P. C. Zwaan and Dr C. E. S. Arps form part of a commission for the examinations concluding the professional training organized by the jewellers' trade. Dr C. E. S. Arps is a member of the Commission for the professional training (preservation, administration, display, education) for museum staff ('Reinwardt Academie', Leiden).

THE STATUS AND POSITION OF RGM

The status of RGM and its position with regard to the Geological Institute, and to the University as such, has been dealt with many times (see also pp. 60, 62) but mostly in correspondence or in unpublished reports [30].

Subsequent directors (Escher, Van der Vlerk, Beets) have claimed that RGM is the national museum for the geological sciences in the Netherlands, an opinion shared by the acting directors (Zwaan, Brongersma). The directors mentioned based their opinion on the fact that RGM took its origin from RMNH. When the last-named was founded by King Willem I (Royal Decree of August 9th, 1820, no. 75, art. 5) it was the King's special wish that the new museum should be known as the 'Nationaal of Rijksmuseum van Natuurlijke Historie'. It was a deliberate decision to appoint a separate director for RMNH, and as the Minister for Public Education, National Industry, and the Colonies (in litt., 20.VIII.1820) pointed out to the Trustees, this implicated that the Cabinet of Natural History of Leiden University was withdrawn from the care of the professor of natural history. Still, it was a rather remarkable situation that the National Museum of Natural History formed part of the University, such as it is stated by the Minister in his decree of December 31st, 1820, no. 3, in which regulations for RMNH

were laid down. From this, it has been assumed that RMNH was nothing but the cabinet of natural history which Leiden University should have according to the earlier Royal Decree of August 2nd, 1815, art. 193 - 194, and it was this argument that Professor J. van der Hoeven used in 1858 to obtain the charge of the museum. The fact that his request was not honoured, shows that the position of RMNH was not that of just a university cabinet of natural history. The special position also follows from the ruling (Royal Decree of August 9th, 1820, no. 75, art. 5; ministerial decree of December 31st, 1820, no. 3, sub 19 and 20) that one of RMNH's duties was to supply, from its duplicates, specimens to the cabinets of the other universities [31]. In exchange for such gifts, RMNH could ask to receive from these cabinets objects that were lacking in the Leiden collections; if a director of one of the cabinets did not cede objects of his own free will, the Minister was to be informed(!). The correspondence on such matters was to be addressed and sent straight to the Minister, and not through the intermediary of the Trustees. As from January 1st, 1822, the expenses of RMNH were separated from those of Leiden University (Royal Decree of April 12th, 1821, no. 120). According to the Trustees, the funds of Leiden University were not sufficient to cover the costs of the museum, and as the national budget had been adopted for a ten-year period, it was not possible to raise the University's funds at short notice. However, when RMNH was founded, the Amsterdam Cabinet of Natural History ceased to exist as a separate unit, and this offered the possibility to replace the budget item for the Amsterdam Cabinet by one for RMNH. The decision must be considered a practical, budgetary measure, rather than a matter of principle to indicate that RMNH had been separated from Leiden University. It has been argumented that RMNH should form part of the University (as it did in 1820), because the preamble of the Royal Decree of August 9th, 1820, and article 2 of that Decree refer to tuition as one of the objects of this national museum. The ministerial decree of December 31st, 1820, also refers to tuition (sub 6 and 7). However this may be, it must be clear that in the course of time points of view may change, and as far as RMNH is concerned they did change, and this museum has become fully independent of the University. When RMNH was founded scientific research was exclusively a matter of the universities (except perhaps for a few wealthy people who could afford to have private collections), and (seen in the light of that time) one could but put the new museum under the competence of a university. Besides, knowledge was restricted, and the teaching of that day was very different from that of to-day. The collections that in 1820 were sufficient to teach the whole of zoology, geology, and mineralogy, to-day would not suffice even for teaching only elementary knowledge of these sciences. The restricted collections were on show, and the very few students that were interested in them could look at the exhibits. At the time, RMNH could satisfy the demands of tuition. In the course of time our knowledge grew, our interests changed, and extensive collections for pure scientific research were needed, and these grew far beyond the needs of tuition. RMNH, which never was linked closely with tuition developed into a scientific institution which in the course of time became fully separated from the University. Following the decision of 1878 to place the geological and mineralogical collections in Martin's care, RGM went another way. It has remained part of the university to the present day, but as mentioned already (p. 62) this proved not to be of benefit to the museum, and the national status of RGM has been endangered by this link with the University (e.g. by Escher considering the National Museum of Geology and Mineralogy to be a department of the Univer-

sity's Geological Institute).

More and more RGM pleaded for independence. On March 24th, 1966, the position of RGM was discussed by authorities of the University, Faculty and Subfaculty, and the director of RGM. It was decided, inter alia, that pending attempts to obtain for RGM a similar, independent position as that of RMNH, and as far as the budget was concerned, RGM would remain provisionally under the Faculty of Sciences (and not under the Subfaculty of Geology and Geophysics). Arrangements were agreed upon concerning the transferring to RGM of collections, after studies on them would have completed by the Institute. In the same year, at the request of the Minister of Education, Arts & Sciences, the Royal Netherlands Academy of Sciences (in litt., 3.V.1966), after consultation with its section for the Earth Sciences and its Committee for the Geological Sciences, declared itself in favour of a more independent status of RGM, thus to give it the status of a truly national museum; to this purpose it should have its own budget, and its own staff, separate from the University. It may be mentioned that earlier already, Brongersma & Brouwer (March, 1962), and Brongersma (8.IV.1963) had pleaded for a merger of RGM and RMNH. But all these discussions were of but little avail. The University kept considering RGM as a part of the Faculty and Subfaculty. In 1972 and the beginning of 1973, a delegation of the staff of RGM discussed the situation with representatives of the University, pleading for a more independent status ('positio sui generis'), but the proposals were shelved for the time being, awaiting the solving of some of RGM's internal problems.

A new element was introduced into the discussion, when at an evil hour, the government decided on a complete reorganisation of tuition of geology in the Netherlands. For Leiden the result would be that most of the staff of the Geological Institute would be transferred to Utrecht, and only a relatively small group would remain at Leiden (chiefly concerned with historical geology and palaeontology). With this important change in mind the University asked itself, whether the unpleasant consequences of this reorganisation, in which RGM was not involved, could not be mitigated by charging RGM with an active part in teaching. This would mean an important change for RGM, because it does not consider teaching at a university one of its tasks. The Board of the University decided to set up a Committee to advise upon the tasks of RGM, and the status and position this museum should have to enable an efficacious discharging of these tasks. The Committee on the Task and Function of RGM [32] started its work on October 18th, 1976, and after but ten meetings it handed in its report on July 14th, 1977 (see also: Piekaar, 1978).

To give RGM the position to which it is entitled, viz., to be truly the national museum of geological sciences in the Netherlands, and to be recognized as such, it should become definitely separated from the University. It should have the same status as RMNH. Personally, the present author is still in favour of merging RMNH and RGM; possibly the National Herbarium should also be included in this merger. The resulting museum should have departments for the various sciences and subsciences corresponding to those of the merging institutions. Not only this would mean that the Netherlands would then have truly a museum covering the whole of natural history, but its public galleries could show the various aspects of these sciences and their interrelationships, and this at a time the interest in natural history is steadily growing, and at which more knowledge is necessary to promote nature conservancy. Such galleries would not only serve to pass information to the general public, but they would also be of great value

to tuition in primary and secondary schools, and even the universities would benefit from them. A merger would lead to a more profitable use of funds. If the funds, now available to the three separate institutions, would be merged, there would be less duplication with regard to the (general) library, to the exhibition service, to the educational department, etc. Of course the realisation of such plans would necessitate an extensive building programme, and with the financial situation as it is to-day (and as it may always be when plans for museums are concerned), this might seem to be a goal that never can be reached. However, if RGM is to obtain just the space that it needs at present (not taking necessary extensions into account), as the National Herbarium is housed in quarters that must be considered temporary only, and as RMNH (judging by the author's experience, 1932 - 1972) is sorely in need of considerable expansion (including space for public galleries), it may prove to be more economical and more efficacious to prepare a building programme for these three institutions together. Even if a merger could not be achieved in the near future, it would be an improvement if these three institutions were situated in close proximity of one another. Too often it is decided to solve lack of space by temporary solutions, but these will give relief for a short time only. At the time it may have seemed to be a good idea to move RGM into the old buildings of an orphanage; one did get more space, and one escaped from the Geological Institute, but one did not consider that old buildings listed as monuments, have their limitations as to the amount of reconstruction that is allowed. A museum can only be efficacious in performing its task if it is housed in a building specially constructed for it, and of sufficient strength to carry the load of the very weighty collections. The old orphanage does not satisfy these conditions. Distributing collections, laboratories, and staff over various buildings (even if the distance between these is not very great) tends to disrupt the contact between the staff members, and this will seriously hamper the team work.

As far as RGM is concerned, even if no merger takes place, one will have to decide whether it will remain a museum just for the geological sciences, or whether (as the present author would advocate) it should develop into a museum for the earth sciences.

Dealing with the future of the museums, one threat to them may be mentioned. Museums are expensive affairs, and one should get as much value as possible for the funds spent on them (cf. Anonymus, 1976). However, there is a tendency to increase the number of museums. In this connection a distinction must be made between museums, which have scientific research as their main task, combined with the instruction of the public through public galleries, and the museums the main object of which is to pass information to the general public by means of exhibitions, lectures, etc. It is of importance that there should be one of the last-named kind of museums in every province, and in every large town (if the two cannot be combined); furthermore, there may be more, less pretentious, small museums spread over the country, e.g., as trail-side museums close to areas of special interest. However, it seems senseless to establish a number of museums that aim at doing research on subjects that have no connection whatsoever with the area where the museum is situated. It would be of more use to the nation if one would develop one museum, and this should be RGM, to be the truly national museum. This would mean that collections of more than local interest should be transferred to the national museum, and this applies especially to the collections in university institutes. Science is subject to fashion,

and as the interest changes, the interest in collections brought together in the past diminishes. During the nearly four years that, as acting director, the present author was in charge of RGM, he met with examples when collections were transferred to RGM at a time that through negligence, their value had diminished considerably. Therefore, it may be urged, that every institution that holds collections that are no longer the subject of active studies, should consider the possibility of transferring such collections to RGM, one of its tasks being to act as archives for the whole of the Netherlands. It is a regrettable, but well-known fact, that some universities do not like to pass materials to institutes belonging to another university, and this is reason all the more to separate RGM definitely from Leiden University.

The 'Committee Task and Function of RGM' expresses its concern about the possibility that new museums may be founded in the near future. In consequence of the reorganisation of the tuition of the earth sciences, Utrecht University will have a very large scientific staff and this might lead to the establishing of a new museum. The Committee considers such possible developments highly undesirable. One should not encroach on the tasks of RGM as the national museum in the geological sciences.

At a time one speaks more and more about the rights and the personal freedom of the individual citizen, it is disturbing to note that many scientists are being hedged in by groups or committees that wish to tell them what research they should do, and how to go about this. That scientists do get together to try and promote research is to be applauded. Sometimes this may lead to a plea for team work, and it is often believed that team work is the solution for everything. However, there are still subjects that can be studied with profit by one scientist on his own, and such a lone hunter may contribute materially to the advancement of his science. Usually such scientists are not much of committee men, and their voice is drowned in the loud cry for team work; this cry may be loudest from people that have no original scientific ideas to offer. One must beware of measures that will tend to seriously hamper research by the individual scientist and that may lead to an impoverishment of scientific life and its aims.

Acknowledgements

In 1963, when director of RMNH, at the request of the Dean of the Faculty of Sciences, I prepared a memorandum on the separation of RGM and RMNH (in litt., 8.IV.1963, 28 pp.; 22.IV.1963, 3 pp.). For this purpose I examined documents in the archives of RMNH and in the Archives of the University's Trustees; also a few documents in the Algemeen Rijks Archief (National Archives), The Hague, were consulted. In December 1972, after having retired from RMNH, at the suggestion of Mr N. F. Hofstee, Secretary of the University, the Board of the University placed me in charge of RGM as acting director. Originally intended for just one month, the nomination was extended to almost four years. The time spent in RGM provided me with the opportunity to study the history of RGM more in detail. Much of this museum's 'prehistory' (the period before 1878) is also the history of RMNH, which has been described by Gijzen (1938). However,

Gijzen dealt with this history as viewed with regard to the development of RMNH's zoological collections. The present survey deals especially with aspects that are of interest to RGM and to the teaching of geology at Leiden.

I am very grateful to the Board of Leiden University for having given me the privilege to be RGM's acting director for almost four years. To Mr K. J. Cath, President of the Board, and to Mr N. F. Hofstee, Secretary of the University, I am indebted for all the interest they showed in RGM's vicissitudes. Many are those in the University's offices who have helped me during the period December 1972 - November 1976. For the present paper I had to consult many documents and I am grateful for all the help recieved from the staff of the University, and from the staff of the University Library (where the old files are stored).

The text has been read by various members of RGM's staff, and they have offered many suggestions for improvement of the manuscript. Still, it must be stressed once more that the views expressed are those of the present author, and that he alone is responsible for them. Special thanks are due to Dr C. F. Winkler Prins, who as editor of Scripta Geologica has done much to improve the text and preparing it for the printers. Without the help of Mr P. P. Takken, Head of the Central Services of RGM, and Mrs C. J. Riethoven née van Leeuwen, the typescript would never have been finished, and for their constant assistance I am very grateful.

Notes

1. 'Fossilium historiam et usus persequitur' (Suringar, 1865, p. 300, note 61).

It must be remembered that at the time the term 'fossil' did not have the meaning it has to-day (i.e., remains of plants and animals found in sediments from the geological past). For the objects that we nowadays call fossils, one used the term 'petrifaction'.

The word 'fossil' derives from the Latin verb: fodere, to dig up; compare also the word 'fossa', a ditch, a canal, a pit. It may be though that in the demonstrations by Cluyt, Paaw, and others, and in the lectures by Hotton, occasionally a fossil in the modern sense of the word was included.

2. At the time the Board of Leiden University consisted of three Trustees nominated for their life-time by the Estates of Holland, and the four Burgomasters of the town of Leiden; the Burgomasters served on the Board for one year, unless they were re-elected as Burgomaster. In August 1754 the Trustees were: Willem, Count Bentink, Lord of Rhoon and Pendrecht (* Schoonheeten near Raalte, 17.X.1704 - † Sorghvliet, near the Hague, 13.X.1774; trustee since 12.II.1745); Cornelis de Witt, Lord of Jaarsveld (* Dordrecht, 14.V.1696 - † Dordrecht, 12.X.1769; trustee since 19.XI.1745); Paulus Sebastiaan le Leu de Wilhem (* The Hague, 1687 - † Rotterdam, 23.X.1759; trustee since 6.VIII.1738). The four Burgomasters were Abraham Alensoon, Raymond Backer, Nicolaas de Bye, and Abraham Hoogenhouck. The board was assisted by a secretary: David van Royen (* Leiden, 5.IV.1699 - † Leiden, 22.II.1764; secretary from 1725 - 1753).

3. Johannes Nicolaas Sebastianus Allamand (* Lausanne, 18.IX.1713 - † Leiden, 2.III.1787), professor of philosophy, University of Franeker, 3.III.1747; professor of mathematics and philosophy, University of Leiden, 1.II.1749; inaugural address 30.V.1749, lectures on natural history (mainly zoology), and since 19.X.1761 also on experimental physics; emeritus 1784.

Suringar, 1867: 266-271. Aa, van der, 4°, 1, 1852: 56 - 57; 8°, new ed., n.d.: 181 - 183; Allamand (Johannes Nicolaas Sebastiaan); G. de Waard, in: Molhuysen & Blok, 1, 1911: 76 - 77: Allamand (Jean Nicolas Sébastien).

4. Conradus Zumbach de Coesfelt (* Leiden, end V.1697 - † Leiden, 15.IV.1780), studied philosophy at Leiden 1713 - 1717, at Cassel (Germany) 1717 - 1720, and again at Leiden,

medicine; medicinae doctor 23.I.1724 (Leiden), was granted permission to lecture on applied mathematics 1722, parish doctor at Leiden. The name is sometimes spelt Zumbag, Zoembag, or Sumbag; Coesveld, Coesfeldt, Koesveld, Koesvelt, Coetsveld, or Coetsvelt.

Aa, van der, 4°, 12, 1878, Z: 21; 8°, 21, 1878: 69 - 71: Zumbag de Koevelt (Conradus); 4°, 12: 28: Koesvelt.

5. Some information about the contents of the Cabinet of Natural History in Allamand's time can be obtained from the accounts of visitors to Leiden.

Ferrner (in: Kernkamp, 1910, pp. 466 - 467) visited the cabinet on June 22nd, 1759. He states that there was but little from the mineral kingdom; he mentions especially a specimen of flos ferri, about three quarters of ıan 'el' long, and about half an 'el' wide (in the Netherlands the 'el' measured 68 cm or about 26¾ inch).

Beckmann (in: Kernkamp, 1912, pp. 369 - 370) came to the cabinet on November 19th, 1762. He mentions fossils from various parts of the world, inter alia, a very large shell more than one 'Elle' wide; a collection of stalactites, and of all kinds of asbestos together with paper and linen made from it; there were also vessels made out of fossilized wood; good samples of native gold and silver, and especially of iron; also samples of rock crystal, and a spoon made from it.

6. Johannes le Francq van Berkhey (* Leiden, 23.1.1729 - † Leiden, 13.III.1812); entered Leiden University 22.IX.1747; medicinae doctor 22.XII.1760; curator Cabinet of Natural History, 1753 - 1761; lector (reader), inaugural address 1.XI.1773. Besides writing on natural history, he also wrote on politics. In 1795 he was dismissed for political reasons. Suringar, 1867: 269, 271 - 278.

7. Sebald Justinus Brugmans (* Franeker, 24.III.1763 - † Leiden, 22.VII.1819). As a surgeon Brugmans did much to save the lifes of wounded soldiers, thousands of which were brought to Leiden after the abortive attempt at an invasion on the Dutch coast in 1799. This earned him the gratitude of French military authorities, and it appears that even Napoleon was impressed by him. Because of this the Leiden collections were not taken to France. Extensive biographies have been published, inter alia, by Mesch (1825) and Capadose (1825).

Aa, van der, 4°, 2, 1855: 451 - 454; 8°, 3, pt. 2, n.d.: 1466 - 1473; J. Sasse Azn, in Molhuysen & Blok, 1, 1911: 487 - 490: Brugmans (Sebald Justinus).

8. In literature different years are mentioned as being the one in which the Cabinet of Prince Willem V was taken to Paris, e.g., Anonymus (1819, p. 746), Van der Klaauw (1926, p. 8), and Dullemeijer (1976, p. 3): 1794; Vrolik (1858, p. 69): 1795; Van der Hoeven (1860, p. 9), Van der Klaauw (1926, p. 56, note 101): 1796; (cf. Gijzen, 1938, p. 25, note 1).

As Prince Willem V left The Hague for England only on January 18th, 1795, it is clear that 1794 cannot have been the year. As pointed out by Scheurleer (1967, p. 33 - 35): Anonymus (1795a, March 27th) announces the pending transportation of the Cabinet; Anonymus (1795b, p. 419) and Anonymus (1795c, October 16th) state that 150 cases have been received in Paris, and that all the zoological collections have already been unpacked; more cases were still to follow. Thus, it is certain that the bulk of the Cabinet was moved to Paris in 1795, but it is not impossible that the remainder did not reach Paris before 1796.

Gijzen also refers to Witkamp (1872, p. XII) who mentions that a live elephant was taken to Paris in 1797, but this does not give any clue to the removal of the Cabinet.

Boeseman (1970, pp. 185 - 186) indicates that parts of the Prince's Collections may have been hidden by loyal subjects, and hence were not taken to Paris. Scheurleer (1967, pp. 33 - 35) states that indeed not everything was taken to Paris.

The Cabinet is often referred to as the Stadtholder's Cabinet.

9. In later years one became more lenient. Some students could be exempted from parts of the examination, e.g., students who took mathematics and physics as major subjects. In this way, in January 1867, Phil. Cand. H. Brongersma was exempted from the examination in geology (Brongersma, 1978, p. 6).

Few students showed a major interest in geology, and but very rarely a doctor's thesis on a geological subject was written (Mesch, 1820).

10. Coenraad Jacob Temminck (* Amsterdam, 31.III.1778 - † Leiden, 30.I.1858). His father, treasurer of the East Indies Company, brought about that, at the age of seventeen, his son was appointed general auctioneer of the Company, a profitable post. Several authors (e.g.,

Portielje & Abramsz, 1922, p. 289; Gijzen, 1938, p. 267; Van der Vlerk, 1957, col. 71*) surmised that Temminck had been in the East Indies, but this was not the case. The colonial products were brought to Amsterdam and there they were auctioned. Van der Vlerk (l.c.) states that it would be putting it too strongly to say that without the failure of the East Indies Company, there never would have been an RGM, but he still sees a connection between these two events. He supposed that Temminck started collecting after his assumed return to Amsterdam. However, Temminck's father had started collecting birds, and Temminck followed his example.

Temminck's collections were mainly zoological, but they also contained geological, palaeontological, and mineralogical objects.

Susanne, 1858; Vrolik, 1858; V(ollenhoven), 1858; De Beaufort, 1920. Aa, van der, 4°, 11, 1876, T: 16 - 17; 8°, new ed., 18, n.d.: 52 - 58; M. J. Sirks, in Molhuysen & Blok, 4, 1918, col. 1299 - 1300: Temminck (Coenraad Jacob).

11. After the death of Brugmans, at their meeting of August 14th, 1819, the Trustees of the University decided to propose C. G. C. Reinwardt (professor at the Athenaeum Illustre, of Amsterdam, and since 1815 on a scientific mission in the East Indies) for nomination to the chairs of natural history and botany. As it would take time before Reinwardt (if nominated) could be back in the Netherlands, they asked Professor G. Sandifort, anatomist of the medical faculty, to take charge of the botanical gardens (the 'Hortus medicus'), and to give courses in botany and in comparative anatomy.

Vrolik (1858, p. 72), Witkamp (1896, p. 195), and Snelleman (1884, p. 178) state that Sandifort was placed also in charge of the Leiden Cabinet of Natural History. Van der Klaauw (1926, pp. 8 - 9) is more reserved in his statements: Sandifort apparently was charged temporarily with the directorate of the University's Cabinet of Natural History; any way, in December 1820, he transferred the cabinet to Temminck's care (l.c., p. 9). Vrolik, Witkamp, and Snelleman also mention this transfer. However, it seems that these authors misunderstood what had happened.

In the meeting of September 4th, 1819, the Trustees entrusted the Cabinet of Natural History to the care of Dr P. G. van Hoorn (since 1817, its deputy director under Brugmans) (minutes, folio, 168) and although Temminck indeed did take over the care for this cabinet, this was when the Royal Decree of August 9th 1820, made the cabinet a part of RMNH.

After the purchase of Brugmans's private collection, the Trustees (meeting of 17.XI. 1819, minutes, fol. 212) entrusted Sandifort with its care, because the collection was housed in the hall used by the professor of botany (as which he acted at the time). Later Sandifort (in litt., 19.IX.1820) had asked permission to incorporate Brugmans' cabinet in that of the Theatrum anatomicum, the Trustees (30.IX.1820, minutes, fol. 80) decided that objects, which did not serve strictly to explain and clarify the structure of the human body, should be transferred to the Cabinet of Natural History (which since 9.VIII.1820, formed part of RMNH). Sandifort (in litt., 21.X.1820) replied that he would not fail to hand over the spirit specimens of animals, the extensive collection of molluscs, etc., the stuffed animals, all the fossil bones, and further, of those species of which there was more than one skeleton or skull, one specimen of each. I suppose that it is this collection which Sandifort handed over to Temminck early in 1821.

Nevertheless, the Trustees (17.I.1821, minutes, p. 7) asked Professor Sandifort to surrender to Temminck the Cabinet of Natural History donated by H. M. to Leiden University, and all that further may belong to it, in such a way as Sandifort might consider most appropriate and suitable. It may be that the Trustees were rather confused with all the cabinets concerned in the merger to found RMNH.

Temminck in his first report on RMNH (in litt., 1.VIII.1821, p. 11) refers only to the transfer by Sandifort of osteological specimens.

12. On the same grounds that Sandifort had been asked to take over part of Brugmans's duties, the Trustees (meeting of 14.IX.1819, folio 168, 169) charged the Secretary to ask J. Clarisse, professor of theology, to give the courses of natural history (i.e. zoology, geology, and mineralogy) as he had always shown considerable interest in these subjects. He had followed lectures by Brugmans, and later attended those by Reinwardt (Bouman, 1850, pp. 89, 94, Van der Klaauw, 1926, p. 9, p. 62 notes 159 - 160, p. 63, note 165).

Aa, van der, 4°, 3, 1858: 122 - 126; 8°, new ed., 3, n.d.: 397 - 405; L. Knappert, in: Molhuysen & Blok, 3, 1914: col. 227 - 229: Clarisse (Johannes).

13. Paulus Godfried van Hoorn (* Delft, 7.X.1777 - † Voorschoten, 5.VIII.1850); entered Leiden University to study medicine, 5.VII.1797; medicinae doctor, 18.VI.1803; since 6.X.1818 member of the Town Council of Leiden.

In 1837, when he was forced to resign, he was 'wethouder' (alderman) of Leiden, general practitioner, and he had about ten other functions in committees and councils, not counting his curatorship with RMNH. Later he became a member of the Estates of the Province of South Holland. In 1841 the King nominated him Knight in the Order of the Netherlands Lion.

Aa, van der, 4°, 6, 1867: 380 - 381, 8°, new ed., 2, n.d.: 1227 - 1229: van Hoorn (Paulus Godfried).

14. However, the draft of a letter from Temminck to the. Minister (dated 18.X.1824), originally stated that Moldenhauer's visit had cost the museum the sum of 2500.— guilders, but the words "s Rijks Museum' were struck out and they have been replaced by 'mijne administratie' (my administration). In RMNH's files I could find no reference to any payment for Moldenhauer's visit and, therefore, I believe that after all Temminck paid the 2500 guilders out of his own pocket. Moldenhauer stayed at Leiden for more than a year.

15. Elte Martens Beima (*Oostermeer, near Bergum, 11.II.1801 - † Leiden, 24.II.1873), originally was intended to succeed his father as a baker. After leaving the elementary school he spent all his spare time in acquiring knowledge of mathematics and astronomy. He was so proficient in this, that Jonkheer J. Aebinga van Humalda (at the time governor of the Province of Friesland), at his private expense, sent Beima to study at Leiden University. There he obtained a doctor's degree (1842). In 1830 after the Belgian insurrection, Beima joined the Leiden students volunteer Rifles which, with the Army, went to fight the Belgians. This will have been an additional recommendation to obtain a post in the museum (Temminck stresses the fact when recommending Beima; Schlegel, then a curator in the museum, also had joined the Rifles).

His only original publication of some length was a treatise on the physical geography of the earth ('Natuurkundige Beschrijving van den Aardbol') forming part of a new edition of Uilkens's 'Volmaaktheden van den Schepper' ('The Creator's Perfections'). Best known are Beima's annotated translations of works by A. von Humboldt, by Leonhard, and by L. Figuier & O. Fraas. When Beima died he left an extensive library (close on 7000 titles) which was auctioned in 1874. The University's Trustees voted 2000 guilders to acquire as much as possible of this library.

Aa, van der, 4°, 12, Bijvoegsel, 1878: 24; 8°, 21, Bijvoegsel, 1878: 77 - 80; G. A. Wumkes, in: Molhuysen, Blok & Kossmann, 6, 1924, col. 92 - 93: Beima (Elte Martens).

16. Hermann Schlegel, *Altenburg (Saxe-Altenburg, now: DDR), 10.VI.1804 - † Leiden, 17.I.1884. Schlegel arrived at Leiden, 25.V.1825, hoping to go to the East Indies to collect for RMNH, but the position had been filled already. Schlegel stayed at Leiden, where in the beginning Temminck privately paid his salary. In 1828 he was nominated curator for vertebrate animals, osteology, and fossils. Director of RMNH 1858 - 1884. Honorary Doctor, 2.III.1832 (Jena).

G. Schlegel, 1884; Snelleman, 1884; Gijzen, 1938: 52 - 63. Sirks, in: Molhuysen & Blok, 4, 1918, col. 1232 - 1233: Schlegel (Hermann).

17. The Minister (in litt., 8.XIII.1877, no. 34, Afd. V, Onderwijs) informs Schlegel that a large petrified tree had been offered for sale. Schlegel (in litt., 14.VIII.1877, no. 64) is of the opinion that this is more of an object for a cabinet of curiosities; for scientific research a small fragment would suffice.

The Trustees (in litt., 25.VIII.1877, no. 330) write that the collection of the late Jonkheer J. T. Binckhorst van de Binckhorst was for sale. Schlegel replies (in litt., 14.VIII. 1877, no. 60) that also the collections of J. A. H. Bosquet and G. C. Ubaghs were for sale; the professor of geology (to be nominated still) should appraise the value of these collections, but Schlegel is not in favour of purchasing them. Rather, the Minister should add them to the collections of Teyler's Museum, Haarlem, just as the Minister did present the fossils from Petrus Camper's collections *(Mosasaurus, Chelonia = Allopleuron)* to the Teyler Museum.

18. I am indebted to Mr M. van den Bosch, RGM, for drawing my attention to Schlegel's 1854 paper. That he did not continue his research on *Mosasaurus* (and on the turtle *Allopleuron)* will have been due to the machinations of Professor J. G. S. van Breda, of Haarlem, then chairman of the Commission for the Geological Map of the Netherlands.

The Commission had entrusted Schlegel with the study of this material, and Van Breda had agreed that all material (also that which he privately owned) should be made available to Schlegel. After it proved that the way some of the early material had been encased in plaster, had led to erroneous interpretations (inter alia by Cuvier), and also that Schlegel was getting very interesting results (H. Schlegel, 1854), Van Breda changed his mind and demanded that the study of this material and the publishing of the results should be left to himself (Van den Bosch, in preparation).

19. Jonker (1914, p. 4) states that Dr F. J. P. van Calker was 'lector' (reader) in mineralogy at Leiden. The Annales Academici for 1865 - 1866 give a list of the teaching staff of Leiden University, first a list of the professors than those that personally have the title of professor (from which Schlegel, who held such a title since 1858, is omitted), and than (on p. 4) a short separate list gives the names of the lectores (readers), the adiutor, and the observator. Van Calker is mentioned as 'Adiutor Professoris physices'.

On p. 83 in the Series Lectionum, at the end of the list of lectores and after the last faculty, one finds: 'F. J. P. van Calker, Adiutor Professoris Physices Mineralogiam et Geologiam docebit die Martis X et die Iovis I'. There is no mention of Van Calker having been a 'lector' (reader).

20. Often it is suggested that the 1876 act on higher education for the first time made it obligatory to teach geology and mineralogy, and that hence the act necessitated the appointing of professors especially for these subjects (and not also to teach other subjects). However, it had been ruled already by the Royal Decree of August 2nd, 1815, that 'the natural history of animals and minerals' (i.e., zoology and geology) had to be taught at every university; to obtain the degree of 'matheseos magister, philosophiae naturalis doctor' one had to pass an examination of which geology formed part; with regard to the tuition of geology every university had to have a collection of rock samples and of minerals. The number of full professors in the Faculty of Sciences being limited to four, it is clear that each of these had to teach various (and often very different) subjects, and this was possible because the knowledge of the sciences was still fairly limited. In the period from 1787 - 1854, geology, mineralogy and palaeontology (or the one or the other of these sciences) were taught by professors, who — considering the standard of knowledge of their days — were fully qualified to do so, viz., S. J. Brugmans (1787 - 1819), J. G. S. van Breda (1831 - 1839), C. G. C. Reinwardt (1823 - 1854). As Rector Magnificus of Leiden University, Reinwardt (1833) read an address about the origin and development of geology. Although the number of chairs was increased in the course of time, attempts to have a chair established for the geological sciences failed until 1877.

The act of 1876 stressed the importance of geology and mineralogy as separate sciences (art. 42, 4°, f., g.), and a doctorate in geology and mineralogy was introduced (art. 83, 4°, d.). Although there still was a possibility to appoint a professor to teach more than one science, there was no limitation of the number of chairs, and the act left open the possibility to create chairs for sciences that had not been mentioned in art. 42. Thus a chair for geology and mineralogy was established, to which were added palaeontology and crystallography (sciences not mentioned in art. 42). Accordingly, one professor had to teach these four sciences, but — as these were related subjects — this was not felt as too much of a burden at the time.

At Leiden, Martin was appointed by Royal Decree of September 10th, 1877, and at Groningen Dr F. J. P. van Calker was appointed by Royal Decree of September 19th, 1977, both appointments to take effect as from October 1st, 1877. Van Calker read his inaugural address on November 5th, 1877, and Martin did so on December 8th, 1877.

21. Johann Karl Ludwig Martin, * Oldenburg (Germany), 24.XI.1851 - † Leiden, 14.XI.1942.

Easton, 1922; Escher, 1931 (bibliography on pp. 6 - 15); Kuenen, 1931; Van der Vlerk, 1931; Umbgrove, 1942 (additions to bibliography on p. 93, note 4; reprint, p. 3, note 4); Altena, 1946.

22. Schlegel's proposal to let the professor of geology have full care of the museum's geological collections seems to be hardly in line with his earlier attitude when the status of the zoological collections was broached. He was adamantine in his refusal to give any saying over the zoological collections to the professors of zoology (J. van der Hoeven, and later C. K. Hoffmann). One must not forget, though, that the situations were very different. Schlegel and Van der Hoeven had very different views about what the collections should contain, how they should be arranged, etc. The same led to a difference of opinion with Hoffmann, who believed that much of the museum's collections could be used more profitable for the practical courses of the students, instead of keeping them in the museum's storerooms. To Schlegel 'true' zoology was systematic zoology (and that as he saw this science), and other fields of zoological research he considered of but secondary importance; he was not willing to sacrifice valuable collections to studies that did not come under 'true' zoology. In 1858 Schlegel received the personal title of professor, but he had not (as supposed by Dullemeijer, 1976, p. 4) any duties in teaching, nor was he a Faculty member. Still, he was not against the museum taking part in the teaching of zoology, if this teaching was done by someone whom he considered capable, and who would take good care of the (often irreplaceable) specimens needed for demonstration. Van der Hoeven and Hoffmann did not meet these requirements. Schlegel had met Martin some years before he was appointed, and he considered him a capable man, to whom one could safely entrust collections. Schlegel was not interested in geological collections, which in his opinion might use up funds that could be spent much better on the zoological collection.

As mentioned on p. 49 Schlegel was not opposed to palaeontological research (see also note 17). From Martin's petition to the States General (see p. 52 - 53) it would appear that originally it was not intended to transfer the palaeontological collections. This transfer may have been done at Martin's request, as he may have held the opinion of geologists that palaeontology is a geological science. Besides, Schlegel may well have accepted this transfer, for this would save RMNH the expenses of maintaining these collections, thus leaving more funds for the zoological collections.

Moreover, Schlegel may have seen the zoologists Van der Hoeven and Hoffmann as a kind of competitors, and this the geologist Martin was definitely not.

23. Escher (in litt., 27.X.1938, second page) states that Martin had no pupils in geology, except for two students who passed their first examination ('candidaatsexamen', more or less equal to B.Sc.) just before Martin retired. Kuenen (1931, pp. 18 - 19) adds that Martin had had hardly any pupils of his own; in fact he taught geology mostly as a side-subject to students who majored in other sciences. Van der Vlerk (1956, p. 1; see note 30) is of the opinion that during Martin's directorate there had been but a single student in geology and he may have meant a student who completed the whole of his study under Martin's guidance.

24. In an article signed 'Gaea' (1881) attention is paid to the collections from the East Indies, of which it was feared that they would have lost their value through labels having been lost, or having become illegible. Indeed some numbers on rock samples were illegible, but as 'Gaea' adds: as yet the number of such useless specimens proved to be small, and the greater part of the collections could be saved and made available for research.

It is supposed that 'Gaea' was H. van Capelle, who in 1880/1881, as a student, served as a voluntary (unpaid) assistant to Martin; on November 23rd, 1885 he obtained a doctor's degree on a thesis on the character of the Tertiary Fauna of the Netherlands East Indies.

25. Berend George Escher, *Gorinchem, 4.IV.1885 - † Oosterbeek (Gld.), 11.X.1967.
Anonymus (Three past pupils), 1967.

26. In reply to a letter from the Trustees of 26.X.1938, no. 1798B, referring to the theft of precious stones, Escher (in litt., 27.X.1938, no. I 1/2) states that although a close contact between the Institute (teaching department) and the museum (RGM proper) is desirable, the best solution would be to transfer RGM to the Section 'Arts & Sciences' of the Ministry of Education, Arts & Sciences, and to appoint a director especially for the museum (who should have some connection with teaching, but must have much more time to deal with the museum). Here RMNH may have served as an example; it was transferred to 'Arts & Sciences' in 1935, Prof. H. Boschma was its director, and he considered this his primary task. Remarkably enough, in a second letter (6.XII.1938, I 1/2), Escher sends a second answer to the

Trustees letter of 26.X.1938, no. 1798B. This time the transferring of RGM to 'Arts & Sciences' is not mentioned; he still pleads for a director especially for RGM, and as an example of possible cooperation between Institute and RGM he refers to the one that exists between the Botanical Laboratory and the National Herbarium.

The change of mind may have been caused by the thesis of Dr Agatha Gijzen on the history of RMNH, in which she (1938, pp. 71 - 72) pleads for palaeozoological collections to be included in a zoological museum, and stating that it has been a correct decision to incorporate the Dubois Collection (the collection from Java which contains the original finds of *Pithecanthropus erectus* (Dubois)) in RMNH. The relevant passages in the thesis so much shocked Escher and Van der Vlerk, that the last-named apparently suggested that professors and their pupils should not be allowed to express themselves in publications on matters of current interest to the University's policy.

27. Isaäk Martinus van der Vlerk, * Utrecht, 31.I.1892 - † Leiden, 29.VI.1974.
Den Tex, 1975.

28. Cornelis Beets, * Klatén, N. E. I., 25.IV.1916. Doctor's degree, Leiden, 19.VIII.1941; director of RGM, 1.X.1963; resigned 1.V.1977, at present detached to RMNH for research on Tertiary Molluscs. For a portrait see De Groot, 1979, fig. 10.

29. From 1.IX.1965 - 1.IX.1967, Dr P. C. Zwaan gave lectures on mineralogy, and since 1.VII.1977 he holds the special chair of gemmology.

From time to time students come to RGM for some months to do research as part of the requirements for the 'doctoraal examen' (comparable to M.Sc.); thus, in 1969 - 1971, two biology students did research on fossil molluscs and fossil mammals respectively. Students in geology did work in the section of mineralogy, and others (among which one from the University of Amsterdam) studied palynology.

Dr C. F. Winkler Prins shared the supervision of the preparation of a doctor's thesis by a student of the University of Oviedo (Spain), and Prof. P. C. Zwaan sat on a committee for two doctor's degrees at the University of Barcelona (Spain).

30. The position and status of RGM has been dealt with, inter alia, in the following documents, copies of which are kept in the museum's archives:

B. G. Escher, in litt., 17.X.1938, I 1/2; 6.XII.1938, 1/2.

A. Brouwer, 30.V.1952: Memorandum betreffende de taak, de beheersvorm en de toekomstige ontwikkeling van het Rijksmuseum van Geologie en Mineralogie, 1 + 14 pp. (memorandum on the task, the administration, and the future developments of RGM). Comments by B. G. Escher, in litt., 9.VI.1952, no. 500.

B. G. Escher, I. M. van der Vlerk & E. Niggli, undated document, but probably from the end of 1952, or beginning of 1953.

Proposal by I. M. van der Vlerk and E. Niggli to take the directorate of RGM and of the Institute in turns, mentioned by Trustees, in litt., 25.X.1953, no. 1283Ic; comments by Escher, in litt., 7.XII.1953, no. 1448.

B. G. Escher, 1955: Memorandum nopens de verdere ontwikkeling van het Rijksmuseum van Geologie en Mineralogie, 6 pp. (memorandum on the future development of RGM).

I. M. van der Vlerk, Christmas, 1956: De Huisvesting van het Rijksmuseum van Geologie en Mineralogie, 12 pp. (the housing of RGM); with letter of 2.I.1957.

A. J. Pannekoek, January, 1957: De bruikbaarheid van de door een eventuele verplaatsing van het Rijksmuseum van Geologie en Mineralogie vrijkomende ruimte voor uitbreiding van het Geologisch en Mineralogisch Instituut der Rijksuniversiteit te Leiden, 6 pp. (the usefulness for the Geological Institute of the space becoming available by the eventual removal of RGM).

L. D. Brongersma & A. Brouwer, March, 1962: Nota betreffende de wenselijkheid van samenvoeging van het Rijksmuseum van Geologie en Mineralogie en het Rijksmuseum van Natuurlijke Historie, 3 pp. (on the desirability of the merging of RGM and RMNH).

L. D. Brongersma, 6.XI.1962: Aide-mémoire: Samenvoeging Rijksmuseum van Natuurlijke Historie en Rijksmuseum van Geologie en Mineralogie, 6 pp. (on merging RMNH and RGM).

L. D. Brongersma, 8.IV.1963: De 'afscheiding' van de geologisch-mineralogische verzamelingen van 's Rijks Museum van Natuurlijke Historie, 28 pp. (the 'separation' of the

geological-mineralogical collections from RMNH); Aanvulling, 22.IV.1963, 3 pp. (additions); Tweede aanvulling, 14.X.1976, 4 pp. (further additions).

C. Beets, various letters and reports; e.g., 3.VII.1964, no. B/V 216; spring, 1965: Memorandum betreffende de ontwikkeling van het Rijksmuseum van Geologie en Mineralogie, 1 + 11 pp. (memorandum concerning the development of RGM); 22.VII.1971: Rapport betreffende de functie van het Rijksmuseum van Geologie en Mineralogie, 7 pp. (report on the function of RGM); 13.IV.1972, no. B/V 152 (position of RGM, etc.).

24.III.1966: Resultaten van de bespreking dd. 24 maart 1966 inzake het Geologisch Instituut en het Rijksmuseum van Geologie en Mineralogie (results of discussion on 24.III.1966 concerning Geological Institute and RGM).

Reports on the meetings of representatives of the RGM staff with those of the University about the position of RGM, 23.VI.1972; 1.XII.1972; 15.XII.1972; 19.I.1973.

L. D. Brongersma, 1975, Report on RGM, 23 + 10 pp.

A. J. Piekaar, c.s., 14.VII.1977: Advies van de Commissie Taak en Functie Rijksmuseum van Geologie en Mineralogie (with seven annexes (i) + 28 + (42 pp.)). (see note 32).

31. This was one of the arguments used in 1820 to merge the various collections. Temminck, who was mainly interested in ornithology and mammalogy, believed it to be sufficient to have one female and one male of those species that showed sexual dimorphism; of the others one specimen did suffice. He was not interested in building up collections showing the range of individual variations, nor to collect materials as evidence of geographical distribution. By merging the collections, there would be many duplicates, and a thrifty Minister saw his chances to provide other universities (Groningen and Utrecht in the northern provinces; Ghent, Louvain, and Liège, in the southern provinces) at little cost.

32. The Committee on the 'Task and Function of RGM' consisted of: Chairman: Dr A. J. Piekaar, retired director-general of Sciences, Ministry of Education and Sciences.

Members: Prof. L. D. Brongersma, retired director of RMNH, and from December 21st, 1972 - November 1st, 1976 acting director of RGM; for reasons of health, he resigned from the Committee; Ir B. P. Hageman, director of the Geological survey of the Netherlands; Dr J. Th. Meyer, director of monuments and museums, Ministry of Culture, Recreation and Social Welfare; Prof. J. Th. Wiebes, professor of taxonomic zoology and evolutionary biology, formerly deputy director of RMNH.

Secretary: Mrs J. E. de Lange née Holle, Leiden University.

Under the guidance of its chairman, and urged on by its secretary the Committee completed its task in ten meetings. On July 14th, 1977, it sent in its report: Advies van de Commissie Taak en Functie Rijksmuseum van Geologie en Mineralogie (RGM), (11) + 28 pp.; with seven appendices: 42 pp. (Advice of the Committee Task and Function RGM).

33. The Netherlands Institute for Scientific Research on Gems and Pearls, which originally was founded on November 17th, 1936, and dissolved in 1951, was founded anew on April 26th, 1957. Founders were the State of the Netherlands, represented by the Trustees of Leiden University and the Federatie ter Behartiging van de Belangen van de Edelmetaalnijverheid en -handel (Federation for the Promotion of the Interests of the gold- and silver-smith's industry and trade).

The aims of the Institute are: to promote scientific research on gems and synthetic stones, pearls, etc.; to give information to the trade and to the public; to promote the general interest in gems, etc.; to organize lectures, courses, and examinations in gemmology. The Institute has a laboratory, housed in RGM, where scientific research on gem stones and on synthetic stones is done; on request it examines gem stones and pearls, and it issues certificates of identity for such objects, but it does not assess their value.

The Institute is governed by a board of seven to nine members. Two members represent the trade; the other members are sought for among professors of mineralogy and crystallography of Leiden University and of other universities. The Director of RGM is also asked to sit on this board, but the previous director refused to do so. Since 1973, the present author, then acting director of RGM, attends he board's meetings in an advisory capacity.

In 1957, Dr P. C. Zwaan was appointed director of the Institute's Laboratory, a function he holds in addition to that of curator of mineralogy of RGM. In 1977, the Institute took an active part in promoting the establishing of a special chair in gemmology by the Leiden University Fund; this chair is held by Dr Zwaan.

References

In this list those authors' surnames that consist of more than one word have been arranged alphabetically according to the last component of the name, e.g., Van der Aa: Aa, van der; De Beaufort: Beaufort, de, etc.
For the printed annual reports 1956/1957 to 1962/1963, see Van der Vlerk, 1957a - 1960, and Zwaan, 1961 - 1963.

AA, A. J. van der, 1852 - 1878. Biographisch Woordenboek der Nederlanden, etc., 4°, 1 - 2; voortgezet door K. J. van Harderwijk, 3 - 4; & G. D. J. Schotel, 5 - 12. — J. J. van Brederode, Haarlem: 1, A, 1852; 2, B, 1855; 3, C, 1858; 4, D, E, 1859; 5, F, G, 1862; 6, H, 1867; 7, I, J, K, 1862; 8, L, M, 1869; 9, N, O, P, Q, 1872; 10, R, S, 1874; 11, T, U, V, 1876; 12 ,W - Z, Bijvoegsel, Nawoord, 1878 (see note at end of References).

Aa, A. J. van der, K. J. van Harderwijk & G. D. J. Schotel, n.d., Biographisch Woordenboek der Nederlanden, etc., new ed. 8°, 1 - 18. — J. J. van Brederode, Haarlem.

Aa, A. J. van der, K. J. van Harderwijk & G. D. J. Schotel, 1876 - 1878. Biographisch Woordenboek der Nederlanden, etc., 8°, 19 - 21 + Bijvoegsel (no mention of 'new edition'). — J. J. van Brederode, Haarlem: 19, 1876; 20, 1877; 21 + Bijvoegsel, 1878.

Altena, C. O. van Regteren, 1946. Prof. K. Martin. — Nature, 157: 866.

Anderson, W. F., 1971. Koninginnetje van elf jaar op geologische verkenning. — Grondboor Hamer, 25, 6: 118 - 128, portrait, figs. (see also: Anonymus ,1970).

Anonymus, 1692. Vreemdigheden en Rariteyten, Die in de Galderije van de Thuyn van d'Academie van Leyden gesien werden. — 8 pp.

——, 1795a. Berigten. — Nieuwe Algemene Konst- Letterbode, 3, 65, March 27th: 97.

——, 1795b. Nouvelles Littéraires. — Magasin Encyclopédique, 2: 419.

——, 1795c. Berigten. — Nieuwe Algemene Konst- Letterbode, 4, 94, October 16th: 121.

——, 1819. Levensschets van S. J. Brugmans, gedeeltelijk naar het Fransch van Bory de St. Vincent. — Vaderlandsche Letteroefeningen, of Tijdschrift Kunsten Wetenschappen, etc., 1819, 2nd part: 737 - 753.

——, 1866. Verslag van het Onderwijs in de Philosophische Faculteit. — Almanak Leidsche Studentencorps, 52: 237 - 240.

——, 1967. In Memoriam Prof. Dr. B. G. Escher. — Geol. Mijnb., 46, 12: 417 - 419, portrait (By three past pupils).

—— [W. F. Anderson], 1970. Koninginnetje van elf jaar op geologische verkenning. — Nammogram, Christmas 1970, 12: 10 - 15, portrait, figs.

——, 1976. De Natuurlijke Historie in het in Nederland na te streven Museumbestel, Bijlage X, in: Nota 'Naar een nieuw Museumbeleid', Tweede Kamer (Second Chamber of the States General). — Session 1976 - 1977, 14, 290, 1 - 2: 101 - 121.

Beaufort, W. H. de, 1920. Coenraad Jacob Temminck (31 Maart 1778 - 30 Januari 1858) uit zijne brieven geschetst. — Ardea, 9, 2: 34 - 43, pls. V, VI.

Beima, E. M., 1852. Natuurkundige Beschrijving van onze Aardbol, in: J. A. Uilkens, De Volmaaktheden van den Schepper, in zijne Schepselen beschouwd, ter verheerlijking van God en tot bevordering van nuttige Natuurkennis, 1. — G. T. N. Suringar, Leeuwarden, VIII + 1 - 301.

Benthem, H. R., 1968. Henrich Rudolf Benthems P. C. und S. Holländischer Kirch- und Schulen-Staat. — Nicolaas Förster, Frankfurt & Leipzig: (42) + 1 - 750.

Berkhey, J. le Francq van, 1771. Natuurlijke Historie van Holland. — 2, 2: 665 - 1257 + (42), pls. VII - X, 1 table, 1 plan.

Boeseman, M., 1970. The vicissitudes and dispersal of Albertus Seba's zoological specimens. — Zool. Meded. Leiden, 44, 13: 177 - 206, pls. 1 - 4.

Bouman, H., 1850. Memoria Joannis Clarisse, Theologi. — C. van der Post, Trajectum ad Rhenum, VIII + 1 - 355.

Brongersma, L. D., 1978. De Erosie ten Spijt. Rede gehouden op 1 november 1978 ter gelegenheid van het Eeuwfeest van het Rijksmuseum van Geologie en Mineralogie. — Rijksmus. Geol. Miner., Leiden: 16 pp.

Capadose, A., 1825. Lofrede op Sebaldus Justinus Brugmans. — Werken Holl. Mij Fraaye Kunsten Wetensch., 7: 362 - 605.

Capelle, H. van, 1885. Het Karakter van de Ned. Indische (cover: Nederlandsch-Indische; half title Nederl.-Indische) Tertiaire Fauna. — Thesis, Leiden; J. F. van Druten, Sneek, (8) + 1 - 205.

Dullemeijer, P., 1976. Van Zoötomie tot Zoölogie. Een historische schets van de Leidse algemene dierkunde. — Univ. Pers, Leiden: VIII + 1 - 114 + (2), 4 figs., 8 pls.

Duparc, F. J., 1975. Een eeuw strijd voor Nederlands Cultureel Erfgoed. — Staatsuitgeverij, 's-Gravenhage: XVIII + 1 - 493, ill.

Easton, N. Wing, 1922. Prof. Dr. K. Martin. — Jaarb. Geol. Mijnb. Gen. Ned. Kol.: 1 - 22.

Escher, B. G., 1931. K. Martin als Directeur van het Rijksmuseum van Geologie en Mineralogie. — Leidsche Geol Meded., 5 (Feestbundel K. Martin): 1 - 16, portrait.

Freudenthal, M., 1975. The RGM data bank programme for storage and retrieval of geological collection data. — Scripta Geol., 31: 1 - 22.

Gaea, 1881. Nog eens het Rijks Geologisch Museum. — Nederl. Spectator, 38: 6 pp. (repr.).

Gijzen, A., 1938. 's Rijks Museum van Natuurlijke Historie 1820 - 1915. — W. L. & J. Brusse, Rotterdam: VII - XII + 1 - 335, frontispiece, 4 pls., 6 figs., plans.

Groot, G. E. de, 1979. Rijksmuseum van Geologie en Mineralogie 1878 - 1978: a retrospect. — Scripta Geol., 48: 3 - 25.

Haan, Guilelmus (= Willem) de, 1825. Specimen philosophicum inaugurale, exhibens monographiam Ammoniteorum et Goniatiteorum. — H. W. Hazenberg Jun., Lugdunum-Batavorum: (6) + I - II + 1 - 169.

Herklots, J. A., 1854. Fossiles de Java. Description des restes fossiles d'animaux des terrains tertiaires de l'île de Java; recueillis sur les lieux par M. Fr. Junghuhn, publiés par ordre de S. M. le Roi des Pays-Bas. Quatrième Partie, Echinodermes. — E. J. Brill, Leiden: 1 - 24, 5 pls. (The only part issued).

Hoeven, J. van der, 1860. Berigt omtrent het mij verleende ontslag als Opperdirecteur van 's Rijks Museum van Natuurlijke Historie te Leiden. — J. H. Gerhard & Co., Amsterdam: 27 pp.

——, 1862. Bijvoegsel tot het 'Berigt omtrent het mij verleende ontslag als Opperdirecteur van 's Rijks Museum van Natuurlijke Historie te Leiden': 4 pp.

Jonker, H. G., 1914. Levensbeschrijving van Prof. Dr. F. J. P. van Calker (1841 - 1913). — Jaarb. Geol. Mijnb. Gen. Nederl. Kol., II, Personalia: *3 - 22*, 8 pls.

Kernkamp, G. W., 1910. Bengt Ferrner's Dagboek van zijne Reis door Nederland in 1759. — Bijdr. Meded. Hist. Gen., 31: 314 - 509.

——, 1912. Johann Beckmann's Dagboek van zijne Reis door Nederland in 1762. — Bijdr. Meded. Hist. Gen., 33: 311 - 461.

Klaauw, C. J. van der, 1926. Het Hooger Onderwijs in de Zoölogie en zijne Hulpmiddelen te Leiden, een historische schets naar aanleiding van het 50-jarig bestaan van het tegenwoordige Zoölogisch Laboratorium. — A. W. Sijthoff, Leiden: (4) + 1 - 131, frontispiece, 1 pl.

Kuenen, Ph. H., 1931. K. Martin als Docent. — Leidsche Geol. Meded., 5 (Feestbundel K. Martin): 17 - 20.

Martin, K., 1877. Theorien der Jetztzeit mit einleitenden Bemerkungen aus der Vorgeschichte der Geologie. Rede gehalten bei Antritt seines Lehramts an der Universität zu Leiden. — E. J. Brill, Leiden: 30 pp.

——, 1878. Notizen über Diamanten. — Zeitschr. Deutsch. Geol. Ges., 30: 521 - 525.

——, 1879. Phosphoritische Kalke von der westindischen Insel Bonaire. — Zeitschr. Deutsche Geol. Ges., 31: 473 - 479.

——, 1879 - 1880. Die Tertiärschichten auf Java, nach den Entdeckungen von Fr. Junghuhn. — E. J. Brill, Leiden: XII + 1 - 164 + VI, XXVIII pls. map.

——, 1938. De Geboorte van het Rijksmuseum van Geologie en Mineralogie. — De Leidsche Geoloog, 5, 4 (lustrumnr.): 9 - 15.

Mesch, H. C. van der Boon, 1820. Disputatio Geologica Inauguralis, De Granite. — H. W. Hazenberg Jr., Lugdunum Batavorum, XVI + 1 - 139.

——, 1825. Lofrede op Sebaldus Justinus Brugmans. — Werken Holl. Mij Fraaye Kunsten Wetensch., 7: 197 - 361.

Molhuysen, P. C., 1913 - 1924. Bronnen tot de Geschiedenis der Leidsche Universiteit 1 - 7. — Rijks Geschiedk. Publ., Martinus Nijhoff, 's-Gravenhage: *1*, 1574 - 7 Febr. 1610, RGP 20, 1913, XVIII + 1 - 185 + (2) + 1* - 506*; *2*, 8 Febr. 1610 - 7 Febr. 1647, RGP 29, 1916, XII + 1 - 309 + (2) + 1* - 374*; *3*, 8 Febr. 1647 - 18 Febr. 1682, RGP 38, 1918, X + 1 - 371 + (2) + 1* - 364*; *4*, 18 Febr. 1682 - 8 Febr. 1725, RGP 45, 1920, VIII + 1 - 380 + (2) + 1* - 323*; *5*, 10 Febr. 1725 - 8 Febr. 1765, RGP 48, 1921, VIII + 1 - 491 + (2) + 1* - 346*; *6*, 10 Febr. 1765 - 21 Febr. 1795, RGP 53, 1923, VIII + 1 - 478 + (2) + 1* - 167*; *7*, 23 Febr. 1795 - 30 Dec. 1811, RGP 56, 1924, VIII + 1 - 381 + (2) + 1* - 157*.

Molhuysen, P. C., & P. J. Blok (eds), 1911 - 1918. Nieuw Nederlandsch Biografisch Woordenboek, 1 - 4. — A. W. Sijthoff, Leiden: *1*, 1911, (4) + IV + col. 1 - 1600; *2*, 1912, (6) + col. 1 - 1600; *3*, 1914, (8) + col. 1 - 1600; *4*, 1918, (8) + col. 1 - 1596.

Molhuysen, P. C., P. J. Blok & Fr. K. H. Kossmann (eds), 1924. Nieuw Nederlandsch Biografisch Woordenboek, 6, (8) + col. 1 - 1440.

Piekaar, A. J., 1978. Toespraak ter gelegenheid van het 100 jarig bestaan van het Rijksmuseum van Geologie en Mineralogie te Leiden, gehouden op 1 november 1978. — Rijksmus. Geol. Miner., Leiden: 6 pp.

Portielje, A. F. J., & S. Abramsz, 1922. Het Artisboek, 2. — P. van Belkum, Zutphen: 1 - 304, ill.

Reinwardt, C. G. C., 1833. Oratio de Geologiae Ortu et Progressu. — S. & J. Luchtmans, Lugdunum-Batavorum: (1) + 1 - 25.

Scheurleer, Th. H. Lunsingh, 1967. De Stadhouderlijke Verzamelingen, in: H. Enno van Gelder, C. Reedijk & A. B. de Vries (eds.), 150 Jaar Koninklijk Kabinet van Schilderijen, Koninklijke Bibliotheek, Koninklijk Penningkabinet. — Staatsdrukkerij, 's-Gravenhage: 9 - 50.

Schlegel, G., 1884. Levensschets van Hermann Schlegel, aangeboden door G. Schlegel. — Jaarb. Kon. Akad. Wetensch. Amsterdam, Levensberichten, 1 - 97 (mainly autobiographical).

Schlegel, H., 1854. Note sur le Mosasaure. — Comptes Rendus hebdom. Acad. Sci., Paris, 39: 799- 802.

Snelleman, J. F., 1884. Hermann Schlegel, in: E. D. Pijzel (ed.), Mannen van Beteekenis in onze Dagen, Levensschetsen en Portretten, pt. 5: 167 - 214, portr.

Suringar, G. C. B., 1861. Over de Beoefening der Voorbereidende en Hulpwetenschappen bij de Medische studie aan de Leidsche Hoogeschool, gedurende de eerste halve eeuw van haar bestaan, inzonderheid over den aanvang en de eerste lotgevallen van het Botanisch Onderwijs. — Ned. Tijdschr. Geneesk., 5: 121 - 138 (repr.: 1 - 55).

——, 1865. De Leidsche Hoogleeraren in de Natuurkundige Wetenschappen, inzonderheid in de Kruid- en Scheikunde, na den dood van Sylvius en vóór Boerhaave's Benoeming tot Professor Chemiae (1672 - 1718). — Ned. Tijdschr. Geneesk., (2) 1, 2e afd.: 275 - 306. (repr.: 1 - 32).

——, 1866. Bijdragen tot de Geschiedenis van het Geneeskundig Onderwijs aan de Leidsche Hoogeschool (van de Stichting der Universiteit in 1575 tot aan den Dood van Boerhaave, 1738) (twelve articles reprinted from Ned. Tijdschr. Geneesk., 1860 - 1866, each with separate pagination).

——, 1867. Het bijeenbrengen eener verzameling van Natuurlijke Voorwerpen voor het Akademisch Onderwijs, omstreeks het midden der Achttiende Eeuw. Eerste afzonderlijke lessen over de Natuurlijke Historie door den Hoogleeraar Allamand, en over de Zoölogie door Le Francq van Berkhey. — Ned. Tijdschr. Geneesk., (2) 3, 2e Afd.: 265 - 284 (repr.: 1 - 20).

——, 1870. Het Onderwijs in de Natuurkundige Wetenschappen, aan de Leidsche Hoogeschool, gedurende het dertigjarige tijdperk van 1785 - 1815. — Ned. Tijdschr. Geneesk., (2) 6, 2e Afd.: 1 - 75 (repr.: 1 - 75).

Susanna, J. A., 1858. Levensschets van Coenraad Jacob Temminck. — Handel. Levensber. Maatsch. Nederl. Letterk., 1858: 45 - 78 (reprint: 1 - 32).

Tex, E. den, 1974. Isaäk Martinus van der Vlerk (31 januari 1892 - 29 juni 1974). — Jaarb. Kon. Ned. Akad. Wetensch., Amsterdam: 190 - 195, portr., 1 fig. (reprint: 1 - 6, portr., 1 fig.).

Umbgrove, J. H. F., 1942. In Memoriam Prof. Dr. K. Martin. — Geol. Mijnb., 4, 11 - 12: 90 - 94, portrait (reprint: 4 pp., pages changed).

Verheijen, J. B. A. J. M., P. H. J. Cuypers & A. A. W. Hubrecht, 1878. Rapport over de Inrigting van eenige voorname Musea van Natuurlijke Historie in het buitenland, naar aanleiding van de voorgenomen stichting van een nieuw gebouw voor 's Rijks Museum te Leiden, uitgebracht door de Commissie benoemd bij Koninklijk Besluit van 10 juli 1877, no. 12. — E. J. Brill, Leiden: VIII, 1 - 204, pls. 1 - 13.

Vlerk, I. M. van der, 1931. Prof. Dr. K. Martin. — Mijnwezen, 17: (reprint: 3 pp.).

——, 1957. Het Rijksmuseum van Geologie en Mineralogie. — Nieuws-Bull. Kon. Ned. Oudh. Bond, 6, 10, 4: *71 - *78, 2 pls.

Vlerk, I. M. van der, 1957a - 1960. Verslag omtrent het Rijksmuseum van Geologie en Mineralogie over het tijdvak 17 september 1956 - 15 september 1957, 1957a: 14 pp., 1 fig.; —— 16 september 1957 - 14 september 1958, 1958: 13 pp.; —— 15 september 1958 - 20 september 1959, 1959: 18 pp.; —— 21 september 1959 - 18 september 1960: 20 pp.

V[ollenhoven], S. C. S[nellen] v[an], 1858. Coenraad Jacob Temminck. — Alg. Konst-Letterbode, 9: 67 - 69.

Vrolik, W., 1858. Levensberigt van Coenraad Jacob Temminck, Lid der Koninklijke Akademie van Wetenschappen. — Jaarb. Kon. Akad. Wetensch., Amsterdam, 1857: 65 - 80.

Wilk, E. van der, 1979. Rijksmuseum van Geologie en Mineralogie 1878 - 1978: Presentation and Education. — Scripta Geol., 48: 27 - 35.

Winter, E. Saxton, n.d. Toen onze Koningin nog een Prinsesje was, Persoonlijke Herinneringen uit de Kinderjaren van onze Koningin, door Hare ex-gouvernante. — Scheltens & Giltay, Amsterdam, 3rd. ed., 1 - 158, frontisp., 14 pls.

Witkamp, P. H., 1869. Vier- en -Twintig Voorgangers. — Jaarb. Kon. Zool. Gen. 'Natura Artis Magistra': 137 - 202 (repr.: 1 - 66).

——, 1872. De Diergaarden van Vroegere en Latere Tijd, in: H. Schlegel, De Dierentuin van het Koninklijk Zoologisch Genootschap 'Natura Artis Magistra', te Amsterdam, met historische herinneringen van H. P. Witkamp. — Gebr. Van Es, Amsterdam, [1863] - 1872 - [1873]. I - XXXII, pls.

Zwaan, P. C., 1961 - 1963. Verslag omtrent het Rijksmuseum van Geologie en Mineralogie over het tijdvak 19 september 1960 - 18 september 1961, 1961: 22 pp.; —— 19 september 1961 - 17 september 1962, 1962: 23 pp., 2 pls.; —— 18 september 1962 -16 september 1963, 1963: 19 pp.

——, 1978. Menik Gall, De Krentjes uit de brei. (Inaugural Address as Professor of Gemmology). — Univ. Pers, Leiden: 19 pp.

Note. — In 1969 B. M. Israël, of Amsterdam, issued a reprint of Van der Aa's Biografisch Woordenboek, 4°. Although it is stated to be an 'Unchanged reprint of the edition, Haarlem, 1852 - 1878', it certainly is not unchanged as the division into volumes and the title pages are concerned. The original consisted of twelve volumes; a supplement ('Bijvoegsel') and a postscript ('Nawoord') were issued with vol. 12, 1878. The reprint edition is divided into seven volumes: vol. I, A - B; II, C - F; III, G - H; IV, I - L; V, M - O; VI, P - S; VII, T - Z, Bijvoegsel, Nawoord. Each of these volumes has two title pages. The first is that of the reprint edition, which mentions three editors, notwithstanding the fact that Van Harderwijk became an editor only from original volume 3 (letter C), and Schotel from vol. 5 (letter F, G). The second title page is intended to give the impression of authenticity. Leaving apart the lacking of the names of the later editors in the volumes which they did edit, all title pages give 1852 as the year of publication. Thus, vol. VII dated 1852, contains the postscript dated August 1878. In the original edition the title pages give the letters that are dealt with in the respective volumes, but this is not done in the reprint. The title pages of the volumes of the original edition have been omitted as also many of the portraits.

Appendix I

SCIENTIFIC STAFF FROM 1751

Cabinet of Natural History, 9.VIII.1751 - 9.VIII.1820

9.VIII.1751 - 2.III.1787, Prof. J. N. S. Allamand, professor of natural history.

1.XI.1753 - 1795, Dr J. le Francq van Berkhey, 'lector' (reader) of natural history; exact date of discharge unknown.

10.III.1787 - 22.VII.1819, Prof. S. J. Brugmans, professor of natural history.

28.V.1817 - [9.VIII.1820], Dr P. G. van Hoorn, deputy director; 4.IX.1819 - 9.VIII.1820, acting director.

[17.XII.1819 - early 1821, Prof. G. Sandifort, in charge of the Cabinet of the late Prof. Brugmans; early in 1821 he handed over part of these collections to RMNH.]

's Rijks Museum van Natuurlijke Historie, 9.VIII.1820 - 1.XI.1878

Only those members of the RMNH staff are mentioned who in one way or another had to deal with the collections that later became those of RGM.

9.VIII.1820 - 30.I.1858, Dr C. J. Temminck, director.
[9.VIII.1820] - 6.I.1838, Dr P. G. van Hoorn, deputy director till 12.I.1822; after that 'conservateur' (curator).
1.I.1823 - 11.VII.1846, Dr W. de Haan, curator of Invertebrates (including fossils); Dr, Leiden, 7.V.1825.
29.XI.1828 - 17.I.1884, Prof. H. Schlegel, till 16.VI.1858, curator of Vertebrates, Osteology, and [Vertebrate] Fossils; acting director, 1857; director and personal title of professor, 16.VI.1858; Dr h. c. Jena, 2.III.1832.
1.II.1838 - 24.II.1873, Dr E. M. Beima, curator of mineralogy and geology (not of palaeontology); Dr, Leiden, 1842.
1.VII.1846 - 31.III.1872, Dr J. A. Herklots, curator of Invertebrates (including fossils); Dr, Leiden, 1861.
16.VI.1858 - 16.VI.1860, Prof. J. van der Hoeven, 'Opperdirecteur' (director in chief).
3.X.1872 - 1.XI.1878, Dr J. G. de Man; assistant, 1872 - 1875; from 1875 curator of Invertebrates (including fossils); Dr, Leiden, 29.IX.1873.

Rijks Geologisch-Mineralogisch Museum, 1.XI.1878 - 18.IX.1922

In some instances it is only known in which academic year a certain staff member served with the museum; the academic year extended from the third Tuesday in September of the one year till that of the following year (Act of 28.IV.1876, art. 46); in such instances the notation 1880/1881, etc., is used.

1.XI.1878 - 18.IX.1922, Prof. J. K. L. Martin, director.
[When in 1884/1885, and 1891/1892 Martin was absent for extended periods of field work, Dr F. A. Jentink, director of RMNH, was acting director of RGM].
1880/1881, H. van Capelle, student (zoologist), volunteered as an assistant.
1888/1889, J. L. G. Schröder van der Kolk, rendered assistance.
1890/1891, Dr J. L. G. Schröder van der Kolk, temporarily assistant.
1894 - 1.V.1895, Dr F. Vogel, assistant (of Bonn, Germany).
1.VII.1895 - 1.V.1897, Dr G. F. Krause, assistant (of Marburg, Germany).
1.IX.1897 - 23.XII.1897, Dr Ernst Freiherr Stromer von Reichenbach, assistant (of Munich, Germany).
1898, F. M. Jaeger (student, chemistry), rendered assistance.
1.V.1899 - 1.VI.1901, Dr F. M. Jaeger, assistant (later, 1908: reader, and 1909: professor of inorganic and physical chemistry, Groningen).
1.I.1901 - 1.IV.1903, E. D. van Oort (in 1904, Dr E. D. van Oort became curator of birds, and from 1915 - 21.X.1933, director of RMNH).
1.IV.1903 - 1.I.1904, L. Peeters, student, assistant.
1.I.1904 - 1.I.1908, Miss H. Icke (had obtained the certificate for teaching botany and zoology in high schools; the examination included geology and mineralogy).
1.V.1908 - 1.I.1910, A. L. W. E. van Veen, curator; during absence of Martin in 1910 (field work): acting director; 20.IX.1911 - 17.VI.1913: 'privaat docent' (unsalaried lecturer), crystallography and mineralogy.
1.XI.1913 - 31.XII.1914, Dr A. Quaas (of Berlin, Germany).
1.VI.1918 - 1.XII.1918, Dr W. N. Kuyper, curator.
1.I.1920 - [1.V.1928], Dr H. Gerth, curator.

Rijksmuseum van Geologie en Mineralogie, since 1922

The data for the period 1922 - 1946 are difficult to trace, especially as it often is not clear what staff was attached to the museum proper or to the teaching department. Escher's annual reports 1922/1923 - 1940/1941 contain a paragraph on 'personnel', but apparently the scientific staff was not considered part of the personnel; the remarks in that paragraph refer to administrative and technical staff only. Thus, the reports do not mention that Dr I. M.

van der Vlerk succeeded Dr H. Gerth, who in 1928 left for the East Indies. The report for 1927/1928 states that a second assistant had been appointed, but no name is mentioned, nor is there any indication what the assistant's task would be. The report for 1941/1942 (written after Escher had resigned, see p. 59) states that Dr L. U. de Sitter had received a permanent appointment, although there is no mention of a temporary appointment in previous reports; De Sitter was curator in the teaching section.

Directors:

18.IX.1922 - 1.VI.1942, V.1945 - 19.IX.1955, Prof. B. G. Escher (resigned in 1942 during the German occupation).
19.IX.1955 - 1.II.1961, Prof. I. M. van der Vlerk.
1.X.1963 - 15.XI.1972 (- 1.V.1977), Dr C. Beets; granted leave 15.XI.1972; resigned 1.V.1977.

Acting Directors:

1.I.1943 - 1944, Prof. H. Gerth, appointed by war-time authorities; did not visit museum after the railway connections were suspended in 1944.
1944 - 1945, Dr N. Heertjes, appointed by war-time authorities; did not come to the museum after the liberation of The Netherlands.
9 - 21.V.1945, Dr L. U. de Sitter.
21.V.1945 - VI.1945, Prof. I. M. van der Vlerk.
2.II.1961 - 1.X.1963, Dr P. C. Zwaan.
15.XI.1972 - 21.XII.1972, Dr G. L. Krol.
21.XII.1972 - 1.XI.1976, Prof. L. D. Brongersma.
1.XI.1976 - present, Prof. P. C. Zwaan.

Assistants:

1.I.1943 - 1944 (1945), Dr W. F. H. Kimpe, scientific assistant, nominated by war-time authorities.
1.X.1945 - 1.I.1946, A. Brouwer.
1948 - 1.XI.1951, Th. H. van der Hammen.
1949/1950, Miss C. W. Spiele (mentioned in report 1949/1950 in chapter on research, but not in the list of staff).
16.III.1950 - 1.VII.1954, G. Kortenbout van der Sluijs; report 1948/1949: 'on a voluntary basis again identified Pleistocene mammals'.
1.XI.1951 - 1.VII.1954, Gerda E. de Groot.
1.II.1953 - 1.VII.1953, J. H. Allaart, temporarily: assistant.
1.VII.1954 - 1955, A. P. Audretsch.
1955/1956 - 1956/1957, F. Kalsbeek.

Curators:

1.I.1920 - 1.V.1928, Dr H. Gerth.
1928 - 1938, Dr I. M. van der Vlerk; 1928 'privaat docent' (unsalaried lecturer); 1931 personal title of 'lector' (reader); 1938, professor extraordinarius; 1957, professor ordinarius of Historical Geology and Palaeontology. Although after 1938 no longer officially attached to RGM, he did spent part of his time on the museum, and according to Escher (Report 1953/1954) Van der Vlerk was in charge of the daily course of affairs in the museum.
1.I.1946 - 1.VIII.1954, Dr A. Brouwer; received teaching assignment in 1954 and was transferred to teaching department.
1.I.1948 - 1.VII.1949, Dr E. den Tex.
1.VII.1948 - 1.XI.1951, H. W. Nelson.
1.VIII.1961 - 1.IV.1968, Dr P. van Gijzel.
1.I.1965 - 1.XI.1966, Dr Th. H. van der Hammen.
1.I.1965 - 1.I.1968, T. A. Wijmstra.
For the following see appendix II:
Dr P. C. Zwaan, Dr Gerda E. de Groot, G. Kortenbout van der Sluijs, Dr C. J. Overweel, G. van der Wegen, Dr M. Freudenthal, Dr H. J. W. G. Schalke, Dr C. F. Winkler Prins, L. O'Herne, Dr J. P. Krijnen, Dr Ph. J. Hoedemaeker, Dr M. van den Boogaard, Dr C. E. S. Arps, Dr J. H. Germeraad, Dr F. J. de Bock, Dr H. Loose, Elisabeth van der Wilk, B. Kuhry.

Since 1948 the original grade of 'conservator' (curator) has been replaced by five different grades, corresponding with the British grades of Assistant Scientific Officer, Scientific Officer, Senior Scientific Officer, Principal Scientific Officer, and Senior Principal Scientific Officer. The appellation 'curator' is still used colloquially to denote a museum scientist, irrespective of the grade he belongs to officially.

Technical officers entrusted with scientific research, and considered members of the scientific staff: M. van den Bosch (1.VI.1969), Mrs. E. J. Noordermeer née Perreijn (1.II.1970 - 1.I.1972), A. W. Janssen (1.VI.1967). For Messrs Van den Bosch and Janssen see Appendix II.

Appendix II

Some idea of the activities of the museum and its staff may be obtained from a list of publications from the last six years (1973 - 1978).

GENERAL SERVICES

Anonymus, 1978. Ontdekkingsreis door de Tijd. — RGM: 28 pp. (mimeogr.).
Arps, C. E. S., H. J. W. G. Schalke & P. P. Takken, 1976. Rijksmuseum van Geologie en Mineralogie. — RGM: 16 pp.
Bertha, F. J. L. Öry, 1976a. Inventaris van Periodieken 1976, Rijksmuseum van Geologie en Mineralogie te Leiden. — RGM: 130 pp. (mimeogr.).
Bertha, F. J. L. Öry, 1976b. Inventaris van Periodieken, 1e Supplement. — RGM 47 pp., (mimeogr.).
Bertha, F. J. L. Öry, 1976c. Boekenlijst voor museumbezoekers. — RGM: 4 pp., (mimeogr.).
Bertha, F. J. L. Öry, 1976d. Vindplaatsenlijst voor museumbezoekers. — RGM: 2 pp., (mimeogr.).
Bertha, F. J. L. Öry & H. Kingma Boltjes, 1978. Inventaris van periodieken 1978. — RGM: 134 pp. (mimeogr.)

EDUCATION SECTION

Arps, C. E. S., & P. P. Takken, 1975. Tekst dia-serie mineralen in zaal mineralogie 1. — RGM: 3 pp.
[Zwaan, P. C.], 1975. Zaal 1: Schoonheid van vorm en kleur in mineraalassociaties. — RGM: 27 pp.
[Wilk, E. van der], 1978a. 100 Jaar Rijksmuseum van Geologie en Mineralogie te Leiden, Het Huis van Oranje en de geologie. — RGM: 8 pp.

THE SCIENTIFIC STAFF AND ITS PUBLICATIONS (1973 - 1978)

The following is a list of the members of the scientific staff of RGM. For each staff member the date is given upon which she or he joined the museum, the specialism, and a list of publications, if any, in the years 1973 - 1978.

Dr. C. E. S. Arps (1.XII.1970): Rock and mineral associations, paragenesis, gemmology.

Arps, C. E. S., 1975a. Het zelf onderzoeken van edelstenen: noodzakelijk, maar heel interessant. — Edelmetaal - Uurwerken - Edelstenen, 29, 1: 78 - 79.
Arps, C. E. S., 1975b, Mineralogical Excursion in Southwest Africa from October 20th to November 15th 1975 under supervision of Prof. Dr G. H. Molz. Geological background information by C. E. S. Arps. — RGM: 13 pp., pls. 1 - 24, 4 charts (mimeogr.).
Arps, C. E. S., 1977a. Diamant: Geografische verspreiding en Geologische gebondenheid. — Edelmetaal - Uurwerken - Edelstenen, 31: 368 - 375, 4 figs., 1 tab.
Arps, C. E. S., P. W. C. van Calsteren, J. D. van Hilgen, R. P. Kuijper & E. den Tex, 1977. Mafic and Related Complexes in Galicia: An Excursion Guide. — Leidse Geol. Meded. 51: 63 - 94.
Arps, C. E. S., 1977b. Amphibolitic Rocks of the Blastomylonitic Graben in Western Galicia (NW Spain): Field Relations and Petrography (Abstract). — V. Reunión sobre la geologia del oeste de la Peninsula Iberica, Leiden - Salamanca - Porto, August 21th - 27th, 1977 (mimeogr.).

Arps, C. E. S., 1977c. Petrography and Possible Origin of Adzes and Other Artefacts from Prehistoric Sites near Hienheim (Bavaria, Germany) and Elsloo, Sittard and Stein (Southern Limburg, The Netherlands). — Anal. Praehist. Leidensia, XI: 202 - 241, figs. 38a - 73, 4 encl.

Arps, C. E. S., 1978a. Indonesia en Sri Lanka: Enige Geologische en Mineralogische Bijzonderheden. — RGM, 11 pp., 5 maps (mimeogr.).

Arps, C. E. S., 1978b. Edelstenen in Zuid-oost Kalimantan. — Edelmetaal - Uurwerken - Edelstenen, 32: 856 - 858.

Dr J. F. de Bock (1.IX.1973 - 1.IX.1976): Foraminifera.

Bock, J. F. de, 1973. Embryonal structures of *Miogypsina* — Scripta Geol., 18: 1 - 15.

Bock, J. F. de, 1976. Studies on some *Miogypsinoides-Miogypsina* s.s. associations with special reference to morphological features. — Scripta Geol., 36: 1 - 137, 61 figs., 44 pls.

Bock, J. F. de, 1977. Some remarks on *Miogypsina (Miogypsina) socini* Drooger, 1954 (Foraminifera) from northern Italy. — Scripta Geol., 40: 1 - 35, 15 figs., 11 pls.

M. van den Bosch (1.VI.1969): Fossil Selachii and the stratigraphy of the Tertiary of the North Sea Basin.

Bosch, M. van den, 1973. Toelichting W.T.K.G.-excursie rond Winterswijk, 8 en 9 september 1973. — 14 pp., maps and sections (mimeogr.).

Bosch, M. van den, M. C. Cadée & A. W. Janssen, 1975. Lithostratigraphical and biostratigraphical subdivision of Tertiary deposits (Oligocene - Pliocene) in the Winterswijk-Almelo region (eastern part of the Netherlands). — Scripta Geol., 29: 1 - 168, 36 figs., 23 pl., 2 encl., 10 tabs.

Bosch, M. van den, 1978. On shark teeth and scales from the Netherlands and the biostratigraphy of the Tertiary of the eastern part of the country. — Meded. Werkgr. Tert. Kwart. Geol., 15, 4: 129 - 136, 1 tab.

Dr. M. van den Boogaard (1.VI.1970): Conodonts from Devonian and younger strata.

Boogaard, M. van den & O. J. Simon, 1973. *Pseudofurnishius* (Conodonta) in the Triassic of the Betic Cordilleras, SE Spain. — Scripta Geol., 16: 1 - 18.

Boogaard, M. van den, & L. J. G. Schermerhorn, 1975. Conodont faunas from Portugal and southwestern Spain. Part 2. A Famennian conodont fauna at Cabezas del Pasto. Part 3. Carboniferous conodonts at Sotiel Coronada. — Scripta Geol., 28: 1 - 36, figs. 1 - 5, pls. 1 - 17, 4 tables.

Dr M. Freudenthal (1.III.1968): Tertiary mammals; Tertiary stratigraphy; computerized registration of museum collections.

Freudenthal, M., 1973. Ein Riesenigel aus dem Neogen Italiens. — Natur Museum, Frankfurt a. M., 103, 12: 427 - 430.

Daams, R. & M. Freudenthal, 1974. Early Miocene Cricetidae (Rodentia, Mammalia) from Buñol (Prov. Valencia, Spain). — Scripta Geol., 24: 1 - 19.

Freudenthal, M., 1975. The RGM data bank programme for storage and retrieval of geological collection data. — Scripta Geol., 31: 1 - 22.

Freudenthal, M., M. T. Meijer & A. J. van der Meulen, 1976. Preliminary report on a field campaign in the continental Pleistocene of Tegelen (The Netherlands). — Scripta Geol., 34: 1 - 27, 9 figs., 2 pls.

Freudenthal, M., 1976. Rodent stratigraphy of some Miocene fissure fillings in Gargano (prov. Foggia, Italy). — Scripta Geol., 37: 1 - 23, 5 figs., 2 pls.

Daams, R., M. Freudenthal & A. van de Weerd, 1977. Aragonian a new stage for continental deposits of Miocene age. — Newsl. Stratigr., 6, 1: 42 - 55, 5 figs.

Freudenthal, M., 1978. Zoogdierfauna's van het Miocene Eiland Gargano, Italia. — Meded. Werkgr. Tert. Kwart. Geol., 15, 1: 19 - 34.

Dr J. H. Germeraad (1.II.1971): Palynology; computerized registration of characters of pollen grains, dinoflagellates, etc.

Germeraad, J. H., 1973a. Data banking ten behoeve van Informatie-overdracht in de wetenschap. — Univ. Belgica Comm., 55: 47 - 53.

Germeraad, J. H., 1973b. A proposal for a computer-based numerical coding system for the description of pollen grains and spores. — Proc. III Intern. Palyn. Conf. Acad. Sci. Inst. Geography, Moscow: 77 - 80.

Germeraad, J. H., 1974. The Data bank of Palynological Species Descriptions at Leiden. — Geol. Mijnb., 53, 6: 454 - 457.

Germeraad, J. H., 1975. Fieldreport of the Palynological Sampling Survey in Jamaica. — RGM: 1 p. (mimeogr.).
Germeraad, J. H., 1976. Palynological examination of 30 samples from Jamaica. A progress report. — RGM: 5 pp. (mimeogr.).
Germeraad, J. H., 1978a. Contribution to the Palynology of El Salvador (C.A.). A progress report. — RGM: 6 pp., 7 pls. (mimeogr.).
Germeraad, J. H., 1978b. Contribution to the Palynology of Guatemala (C.A.). A progress report. — RGM: 6 pp., 6 pls. (mimeogr.).
Germeraad, J. H., 1978c. Contribution to the Palynology of Jamaica (B.W.I.). A progress report. — RGM: 17 pp. (mimeogr.).
Germeraad, J. H., 1978d. Contribution to the Palynology of the Cretaceous of Jamaica (B.W.I.). A progress Report. — RGM: 7 pp., 1 pl. (mimeogr.).
Germeraad, J. H. & A. F. E. van der Horst, 1978. Aspects of storage and retrieval of palynological species descriptions. — Ann. Mines Belgique, 3e livr.: 341 - 349.

Dr Gerda de Groot (1.XI.1950): Palaeozoic corals.
Groot, G. E. de, 1979. Rijksmuseum van Geologie en Mineralogie 1878 - 1978. A Retrospect. — Scripta Geol., 48: 3 - 25.

Dr Ph. J. Hoedemaeker (1.IV.1969): Biostratigraphy of Lower Cretaceous ammonites from Spain.
Hoedemaeker, Ph. J., 1973. Olisthostromes and other delapsional deposits, and their occurrence in the region of Moratalla (Prov. of Murcia, Spain). — Scripta Geol., 19: 1 - 206, 60 figs., 13 enclosures.
Hoedemaeker, Ph. J., 1978. Dinosauriërs. — Gea, 14: 65 - 72.

A. W. Janssen (1.VI.1969): Tertiary molluscs of the North Sea Basin.
Hinsbergh, V. W. M. van, A. W. Janssen & L. M. B. Vaessen, 1973. Een profiel door oligocene en kwartaire afzettingen ten westen van het dorp Kleine Spouwen (België, prov. Limburg). — Meded. Werkgr. Tert. Kwart. Geol., 10, 1: 9 - 28, 2 figs.
Janssen, A. W. & L. van der Slik, 1974. Bemerkungen zu der Astartiden-Fauna des jüngeren Känozoikums des Nordseebeckens. — Scripta Geol., 22: 1 - 23, 3 figs., 4 pls.
Janssen, A. W., 1974. Het Profiel van de Bouwput onder het eerste Kanaaldok nabij Kallo, Provincie Oost Vlaanderen, België. — Meded. Werkgr. Tert. Kwart. Geol., 11, 4: 173 - 185.
Janssen, A. W. & L. van der Slik, 1974. De fossiele schelpen van de Nederlandse stranden en zeegaten, tweede serie, 6. — Basteria, 38: 45 - 81.
Bosch, M. van den, M. C. Cadée & A. W. Janssen, 1975. See: M. van den Bosch 1975.
Janssen, A. W., 1975a. Systematische lijst van Nederlandse recente en fossiele mollusken. — Meded. Werkgr. Tert. Kwart. Geol., 12, 4: 115 - 170.
Janssen, A. W., 1975b. Schelpen. — Dienst voor Sport en Recreatie, Bureau Natuurrecreatie en -educatie Gemeente Rotterdam: 1 - 28.
Cadée, M. C., V. W. M. van Hinsbergh & A. W. Janssen, 1976. Een profiel door tertiaire en kwartaire afzettingen tussen Tongeren en Waltwilder (België, provincie Limburg). — Meded. Werkgr. Tert. Kwart. Geol., 13, 2: 35 - 58.
Janssen, A. W., V. W. M. van Hinsbergh & M. C. Cadée, 1976. Oligocene deposits in the region North of Tongeren (Belgium), with the description of a new lithostratigraphical unit: the Atuatuca Formation. — Meded. Werkgr. Tert. Kwart. Geol., 13, 3: 75 - 115.
Stoppelaar, C. F., A. W. Janssen et al., 1976. Handleiding en Atlas voor het medewerken aan de European Invertebrate Survey. — Nederl. Malacol. Ver. Mollusken Comité, 1976: 1 - 27, 37 maps (mimeogr.).
Nieuwenhuis-Verveen, G. W. J., J. G. B. Nieuwenhuis & A. W. Janssen, 1976. Lijst van mogelijke verzamelingen, verzamelaars en determinatoren van Nederlandse Mollusca. — Nederl. Malacol. Ver. Mollusken Comité: 1 - 10 (mimeogr.; 2nd revised ed., 1978).
Janssen, A. W., 1977a. Rapport betreffende een tijdelijke ontsluiting in de Zanden van Boutersem en de mergel met Chara te Hoogbutsel, Gemeente Boutersem, België. — Velpeleven, Boutersem, 4, 6: 250 - 253.
Janssen, A. W., 1977b. Rapport betreffende een ontsluiting in de vertebratenhorizon van Hoogbutsel, Gemeente Boutersem, België. — Velpeleven, Boutersem, 4, 6: 254 - 260.
Janssen, A. W. & J. van der Linden, 1977. Beschrijving van een nieuw hulpstuk voor de edelmanboor en enkele opmerkingen over de praktische toepassing van het handboren. — Meded. Werkgr. Tert. Kwart. Geol., 14, 3: 63 - 72 (mimeogr.).

Cadée, M. C. & A. W. Janssen, 1977. Literatuurbespreking. — Meded. Werkgr. Tert. Kwart. Geol., 14, 4: 127 - 128 (mimeogr.).

Janssen, A. W., 1978. Reworked fossils (mainly molluscs) from a fluvio-glacial deposit near Dinxperlo, Province of Guelders, The Netherlands. — Meded. Werkgr. Tert. Kwart. Geol., 15, 2: 53 - 65, 1 fig., 2 tab., 1 pl.

Janssen, A. W. & L. van der Slik, 1978. De fossiele schelpen van de Nederlandse stranden en zeegaten, 7. — Basteria, 42: 49 - 72, pls. 47 - 53.

Janssen, A. W., M. C. Cadée, V. W. M. van Hinsbergh & P. A. M. Gaemers, 1978. Lithology and Stratigraphy of Oligocene of the Belgium provinces Limburg and Brabant. — Excursion Guide, Trips D and H. Paläontologische Gesellschaft, Palaeontological Association, Joint annual meeting Maastricht, 1978: 1 - 47, 18 figs.

Kruissink, E. C., V. W. M. van Hinsbergh & A. W. Janssen, 1978. Een oost-westprofiel door Oligocene afzettingen in de gemeente Borgloon (België, Provincie Limburg). — Meded. Werkgr. Tert. Kwart. Geol., 15, 1: 3 - 18, 1 tab., 4 figs.

Dr J. P. Krijnen (1.III.1969; 1.IX.1973 - 1.IX.1976, and 1.IX.1978 - 1.IX.1980 detached to Geological Survey of Jamaica): Foraminifera; Stratigraphy of Jamaica.

Krijnen, J. P. & A. C. Lee Chin, 1977. Geology of the Northern, Central and South-Eastern Blue Mountains, Jamaica, with a Provisional Compilation Map of the Entire Inlier: A Progress Report Relative to the Blue Mountain Mapping Programme. — RGM: 41 pp. (mimeogr.).

Krijnen, J. P., 1978. Pseudorbitoids from the Barguera Limestone, Puerto Rico, and from the Back Rio Grande Limestone, Jamaica, with remarks on the pseudorbitoidal evolutionary pattern. — Geol. Mijnb., 57: 233 - 242.

Krijnen, J. P. & A. C. Lee Chin, 1978. Geology of the northern, central and south-eastern Blue Mountains, Jamaica, with a provisional compilation map of the entire inlier. — Geol. Mijnb., 57: 243 - 251.

B. Kuhry (1.XI.1978): Biometrics.

Dr H. Loose (detached to RGM, 1.VIII.1975): Quaternary mammals.

Loose, H., 1975. Pleistocene Rhinocerotidae of W. Europe with reference to the recent two-horned species of Africa and S. E. Asia. — Scripta Geol., 33: 1 - 59, 9 figs., 15 tables, 13 pls.

L. O'Herne (26.VIII.1968): Foraminifera.

O'Herne, L., 1974. A reconsideration of *Amphistegina lessonii* d'Orbigny, 1826, sensu Brady 1884 (Foraminifera). — Scripta Geol., 26: 1 - 55, 3 figs., 20 pls., 3 enclos.

O'Herne, L., 1976. A comparison of *Lepidocyclina ferreroi* (Provale, 1909) and *Lepidocyclina multilobata* (Gerth, 1939). — Scripta Geol., 35: 1 - 47, 3 figs., 26 pls.

Dr C. J. Overweel (15.VII.1957; since 1973 detached to Institute of Prehistory, Leiden University): mineralogy and petrology of prehistory artefacts.

Overweel, C. J., 1977. Distribution and transport of Fennoscandinavian indicators. — Scripta Geol., 43: 1- 117, 54 figs., 1 folding map.

Dr C. F. Winkler Prins (1.VII.1968): Carboniferous and Permian Brachiopoda; stratigraphy of the Carboniferous.

Bless, M. J. M. & C. F. Winkler Prins, 1973. Paleoecology of Upper Carboniferous strata in Asturias (N. Spain). — Septième Congr. Intern. Stratigraphie Géologie Carbonifère, Krefeld, 1971, 2: 129 - 137.

Holub, V. M. & C. F. Winkler Prins, 1977. General Account of the IUGS Subcommission on Carboniferous Stratigraphy Field and General Meeting in Czechoslovakia, September 17 - 27, 1973. In: 'Symposium on Carboniferous Stratigraphy' (V. M. Holub and R. H. Wagner, Editors). — Special Publ. Geol. Surv. Prague: 38 - 53.

Wagner, R. H., R. K. Park, C. F. Winkler Prins & M. Lys, 1977. The post-Leonian Basin in Palencia: A Report on the Stratotype of the Cantabrian Stage. In: 'Symposium on Carboniferous Stratigraphy' (V. M. Holub and R. H. Wagner, Editors). — Special Publ. Geol. Surv. Prague: 89 - 146.

Martínez Chacón, M. L. & C. F. Winkler Prins, 1977. A Namurian brachiopod fauna from Meré (Province of Oviedo, Spain). — Scripta Geol., 39: 1 - 67, 5 figs., 14 pls.

Dr H. J. W. G. Schalke (1.VI.1968): Palynology of the Tertiary and Quaternary.

Schalke, H. J. W. G., 1973. The Upper Quaternary of the Cape Flats Area (Cape Province, South Africa). — Scripta Geol., 15: 1 - 57, 10 figs., 5 pls., 3 tabl., 8 append.

Wijmstra, J. A. & H. J. W. G. Schalke, 1973. Other Sections in the Dinkel Valley. In: T. van der Hammen and T. A. Wijmstra. Upper Quaternary of the Dinkel Valley. — Meded. Rijks Geol. Dienst, N.S. 22: 131 - 140.

Arps, C. E. S., H. J. W. G. Schalke & P. P. Takken, 1976. See: Arps, 1976. General Services.

Schalke, H. J. W. G., & P. W. Bosch, 1978. Neogene and Quaternary between Venlo and Maastricht. — Excursion Guide excursion B and F. Paläontologische Gesellschaft, Palaeontological Association, Joint annual meeting, Maastricht 1978: 1 - 19, map, figs. 1 - 13, 6 encl.

G. Kortenbout van der Sluijs (16.III.1950; 1973 - 1978 detached to Geological Institute, Leiden University): Quaternary mammals of The Netherlands and neighbouring areas.

G. van der Wegen (19.I.1965): Basic metamorphic rocks.

Wegen, G. van der, 1974. Annex A. Two-Sodium-Amphiboles from Carbonate Rocks. In: 'Pre-Cambrian in North Africa' by H. M. E. Schürmann. — E. J. Brill, Leiden: 283 - 287, pls. A, B, tab. 1, 2.

Wegen, G. van der, 1978. Garnet-bearing metabasites from the Blastomylonitic Graben, western Galicia, Spain. — Scripta Geol., 45: 1 - 95, 29 figs., 6 pls.

Elisabeth van der Wilk (1.IX.1976): Education and presentation.

Wilk, E. van der, 1979. Rijksmuseum van Geologie en Mineralogie 1878 - 1978. Presentation and Education. — Scripta Geol., 48: 27 - 35.

Prof. P. C. Zwaan (16.XII.1951): Mineralogy, especially gemmology.

Zwaan, P. C., 1973a. Het edelsteencongres te Vitznau, Zwitserland. — Edelmetaal-Uurwerken-Edelstenen, 27: 42 - 43.

Zwaan, P. C., 1973b. Turkoois, een klassieke steen. — Edelmetaal-Uurwerken-Edelstenen, 27: 172 - 173.

Zwaan, P. C., 1973c. Synthetische spinel, een veel voorkomende imitatie van edelstenen. — Edelmetaal-Uurwerken-Edelstenen, 27: 490 - 491.

Zwaan, P. C., 1973d. Maansteen, een zeer aparte steen. — Edelmetaal-Uurwerken-Edelstenen, 27: 612 - 613.

Zwaan, P. C., 1973e. Naamgeving van variëteiten van chalcedoon. — Edelmetaal-Uurwerken-Edelstenen, 27: 688.

Zwaan, P. C., 1974a. Het 'diamant-gebeuren' in het Amsterdam-Hilton-hotel. — Edelmetaal-Uurwerken-Edelstenen, 28: 52 - 53.

Zwaan, P. C., 1974b. Spinel, een miskende edelsteen. — Edelmetaal-Uurwerken-Edelstenen, 28: 196 - 197.

Zwaan, P. C., 1974c. De verschillen tussen natuurlijke en synthetische smaragd. — Edelmetaal-Uurwerken-Edelstenen, 28: 301 - 303.

Zwaan, P. C., 1974d. Rhodoliet granaat van Tanzania. — Edelmetaal-Uurwerken-Edelstenen, 28: 406 - 407.

Zwaan, P. C., 1974e. Korund van Tanzania. — Edelmetaal-Uurwerken-Edelstenen, 28: 512 - 513.

Zwaan, P. C., 1974f. Almandien-granaat van Tanzania. — Edelmetaal-Uurwerken-Edelstenen, 28: 618 - 619.

Zwaan, P. C., 1974g. Synthetische turkoois en Synthetische opaal, twee nieuwe producten in de edelstenenhandel. — Edelmetaal-Uurwerken-Edelstenen, 28: 708.

Zwaan, P. C., 1974h. Toermalijn van Tanzania. — Edelmetaal-Uurwerken-Edelstenen, 28: 852 - 853.

Zwaan, P. C., 1974i. Sri Lanka (Ceylon), eiland van edelstenen. — Edelmetaal-Uurwerken-Edelstenen, 28: 976 - 977.

Zwaan, P. C., 1974j. De edelstenen van Sri Lanka (Ceylon). — Edelmetaal-Uurwerken-Edelstenen, 28: 1092 - 1093.

Zwaan, P. C., 1974k. Het winnen en het slijpen van edelstenen op Sri Lanka (Ceylon). — Edelmetaal-Uurwerken-Edelstenen, 28: 1228 - 1229.

Zwaan, P. C., 1974l. De handel in edelstenen op Sri Lanka (Ceylon). — Edelmetaal-Uurwerken-Edelstenen, 28: 1334.

Zwaan, P. C., 1974m. Über drei gelungene Fälschungen in der Edelstein-sammlung des Rijksmuseum van Geologie en Mineralogie in Leiden. — Z. Dt. Gemmol. Ges., 23: 161 - 164.

Zwaan, P. C., 1974n. Garnet, corundum and other gem minerals from Umba, Tanzania. — Scripta Geol., 20: 1 - 41, 24 figs., 10 tables.

Zwaan, P. C., 1975a. Minerais do Brasil-Minerals of Brasil (Boekbespreking). — Edelmetaal-Uurwerken-Edelstenen, 29: 1.

Zwaan, P. C., 1975b. Het herkennen van de meest voorkomende mineralen langs makroskopische weg. — RGM: 6 pp. (mimeogr.).
Zwaan, P. C., 1975c. Synthetische alexandriet, een nieuw kunstmatig product in de edelsteenhandel. — Edelmetaal-Uurwerken-Edelstenen, 29: 635.
Zwaan, P. C., 1975d. Katteogen, edelstenen met een bijzonder karakter. — Edelmetaal-Uurwerken-Edelstenen, 29: 874 - 875.
Zwaan, P. C., 1976a. De edelsteencollectie van het Smithsonian Instituut te Washington. — Edelmetaal-Uurwerken-Edelstenen, 30: 50 - 51.
Zwaan, P. C., 1976b. Boekbespreking: 'Genus in Jewellery' - Robert Webster. — Edelmetaal-Uurwerken-Edelstenen, 30: 192.
Zwaan, P. C., 1976c. Tsavoriet, een nieuwe variëteit van grossular (granaat). — Edelmetaal-Uurwerken-Edelstenen, 30: 338.
Zwaan, P. C., 1976d. De Federatie-studiereis naar Sri Lanka en India 1976. 1. Het bezoek aan Sri Lanka (Ceylon). — Edelmetaal-Uurwerken-Edelstenen, 30: 427 - 429.
Zwaan, P. C., 1976e. De Federatie-studiereis naar Sri Lanka en India 1976. 2. Het bezoek aan India. — Edelmetaal-Uurwerken-Edelstenen, 30: 534 - 535.
Zwaan, P. C., 1976f. Fluorescentie als hulpmiddel bij het onderzoek van edelstenen. — Edelmetaal-Uurwerken-Edelstenen, 30: 762 - 763.
Zwaan, P. C., 1976g. Jade en op jade gelijkende edelstenen. — Edelmetaal-Uurwerken-Edelstenen, 30: 917 - 918.
Zwaan, P. C., 1976h. Een bezoek aan de Opaalafzettingen in Lightning Ridge, Australia. — Edelmetaal-Uurwerken-Edelstenen, 30: 1188 - 1189.
Korevaar, H. J. & P. C. Zwaan, 1977. Kornerupine Cat's-eyes from Sri Lanka. (Ceylon). — J. Gemmol., 15: 225 - 230, 5 figs.
Zwaan, P. C., 1977a. De meest bedrieglijke imitaties van enkele bekende edelstenen. — Edelmetaal-Uurwerken-Edelstenen, 31: 390 - 392, 5 figs.
Zwaan, P. C., 1977b. Internationale Edelsteen Conferentie in Nederland. — Edelmetaal-Uurwerken-Edelstenen, 31: 1581 - 1582.
Zwaan, P. C., 1977c. Het bepalen van de kwaliteit van diamant in de Verenigde Staten van Amerika. Samenvatting van de voordracht van G. R. Crowningshield uit New York. — Edelmetaal-Uurwerken-Edelstenen, 31: 1585.
Zwaan, P. C., 1977d. Enkele ervaringen met industriediamant. Samenvatting van de voordracht van B. W. Anderson uit Engeland. — Edelmetaal-Uurwerken-Edelstenen, 31: 1585.
Zwaan, P. C. & H. J. Korevaar, 1977. Cordierit-Katzenaugen - vermutlich aus Indien. —. Z. Dt. Gemmol. Ges., 26: 197 - 201.
Zwaan, P. C., 1978a. Nieuwe hulpmiddelen bij het beoordelen van diamant. — Edelmetaal-Uurwerken-Edelstenen, 32: 54.
Zwaan, P. C., 1978b. 'Djevaliet', een nieuwe zeer vernuftige imitatie van diamant. — Edelmetaal-Uurwerken-Edelstenen, 32: 55.
Zwaan, P. C., 1978c. Menik Gall, de krentjes uit de brij. Inaugural address read 12.V.1978. — Universitaire Pers, Leiden: 1 - 19.
Zwaan, P. C., 1978d. Singapore, ook voor ons vak interessant. — Edelmetaal-Uurwerken-Edelstenen, 32: 620.
Zwaan, P. C., 1978e. Edelstenenonderzoek: een jaar met hoogtepunten. — Edelmetaal-Uurwerken-Edelstenen, 32: 752 - 753.
Zwaan, P. C., 1978f. Synthetische alexandriet en synthetische smaragd, twee nieuwe producten van Japans fabrikaat, op de Nederlandse markt. — Edelmetaal-Uurwerken-Edelstenen, 32: 842.
Zwaan, P. C., 1978g. Nieuws van het Nederlands Edelsteen Laboratorium. — Edelmetaal-Uurwerken-Edelstenen, 32: 843.
Zwaan, P. C., 1978h. Edelstenen uit het Baikal gebied in Siberië. — Edelmetaal-Uurwerken-Edelstenen, 32: 1495-1496. [Erroneously the printers replaced 'Baikal' by 'Balkan'].
Zwaan, P. C., 1978i. De praktische betekenis van de gemmologie. — Jaarverslag Leids Universiteits-Fonds 1977 - 1978: 14 - 15.
Zwaan, P. C., 1979. Rijksmuseum van Geologie en Mineralogie. Preface. — Scripta Geol., 48: 1.