

3. Malacology in the Netherlands: Systematic and descriptive malacology

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3a. INTRODUCTION

Systematic and descriptive malacology are very closely connected. In fact, with the decline of classical comparative anatomy at the university zoology departments, this branch of science is now almost completely in the hands of the taxonomist. Systematical malacology increasingly uses the results of comparative anatomy in order to interpret relationships, phylogeny and evolution. Data on the reproductive system, radula and jaw are of the utmost importance in this context, but other anatomical data such as details of the alimentary tract, nerve system and chromosomes are also being employed widely. On the other hand, much and sometimes very detailed descriptive anatomical work has been done by experimental malacologists (particularly those of the Amsterdam Free University) as an introduction to their own type of research.

Descriptive malacology in the Netherlands has a long history. Dance in his comprehensive treatise on shell collecting (Dance, 1966) has repeatedly drawn attention to the importance of Holland as a major centre of collections (and auctions), more particularly in the 17th and 18th centuries. The city of Amsterdam has played its own part as the main port of trade and commerce of the United Provinces and much material has been distributed over western and central Europe from that centre. As a seafaring nation the Dutch have always been at the

crossroads of trade and commerce. As colonial empire builders they played a major role in world history, particularly in the 17th century until the sharp decline towards the end of the 18th century. A taste for collecting curious objects was greatly fostered and influenced by a class of wealthy merchants, business and professional people. In Holland the formation of natural history collections has never been as much the privilege of royalty and nobility as in many other European countries. Pride of place here goes to the stolid burgher with his overseas trade connections.

The well-known etching of a seemingly sinistral *Conus marmoreus* by the famous painter Rembrandt (1606-1669) is symbolical for the upsurge of a long sustained interest in exotic shells. Rembrandt figured his specimen in mirror image as a consequence of the technique employed and only later did people realize that gastropods have a symmetry of their own when these shells were shown as they present themselves to the eyes of the observer.

The earliest Dutch conchologists and collectors of note were Rumphius (1627-1707), Valentijn (1656-1727), Seba (1665-1736) and Lyonet (1706-1789). Much has been written about the early development of conchology in the Netherlands (Dance, 1966; Van Benthem Jutting, 1939, and others) so that there is no need to repeat this here. Local molluscs were little or not in favour because of their comparatively small size and lack of spectacular shape and colour pattern. An admirable summary on the history of the study of Dutch recent molluscs, also covering the experimental sciences, was published on the occasion of the 25th anniversary of the Dutch malacological society (Van Benthem Jutting, 1959). Again, there is no reason to repeat all this in detail; the paper did not cover studies on fossils nor work on foreign molluscs by Dutch scientists.

As regards collecting, a more scientific attitude towards mollusc material was, however, very slow in developing and only really started with the establishment of the two public museums (Leiden, 1820; Amsterdam, 1838). Both institutions grew from a nucleus of private collections, the national museum in Leiden with partly a royal background [cabinet of Prince William V (1748-1806), the stadtholder of the Republic of the Seven Provinces, father of King William I (1772-1843) of the Netherlands, who founded the museum], the Amsterdam museum with a solid background of private enterprise in the commercial and professional circles of the country's largest city.

Our greatest malacologist, the distinguished amateur M.M. Schepman, looms large in this context, having been closely connected with both museums over a long period. This coincides with one of the earliest and greatest Dutch marine biological and malacological ven-



Fig. 1. M.M. Schepman (1847-1919), honorary collaborator of the Rijksmuseum van Natuurlijke Historie, Leiden, and the Zoölogisch Museum, Amsterdam. Photo courtesy Dr. H.E. Coomans (archives Zoölogisch Museum).

tures, the Siboga expedition. The expedition on board H. Nl. M. S. Siboga under the command of lieutenant-commander G.F. Tydeman (after whom our latest and most up to date oceanographical research vessel has been named) and under the scientific leadership of Prof. Max Weber for almost a year cruised the waters of the then Netherlands East Indies (Indonesia) in 1899-1900. The Siboga made profuse collections of almost all groups of animals, among which the molluscs figured very prominently. The molluscs have been described in the period 1902-1954 in twenty folio parts by 11 authors: W. Adam, A. Bavay, R. Bergh, M. Boissevain, Ph. Dautzenberg, H.F. Nierstrasz, P. Pelseneer, B. Prashad, M.M. Schepman, H.A. Stork, and J.J. Tesch. The twenty parts form together five volumes containing a total of 1955 pages and 156 plates — the largest ever malacological work published in the Netherlands. Schepman wrote seven of these parts, covering the prosobranch and pulmonate gastropods and part of the Opisthobranchia in 1908-1913. Holotypes of most of the molluscs from this expedition are in the Amsterdam museum; many paratypes have been lodged in the Leiden museum. More data on Schepman are to be found on pp. 11 and 20.

Fossil molluscs have also drawn attention already a long time ago. There are two major fossil mollusc collections, those of the Rijksmuseum van Geologie en Mineralogie (Leiden) and of the Rijks Geologische Dienst (Haarlem).

Apart from the above-indicated major public collections there are some others as well as a not inconsiderable number of private collections among the membership of the Dutch malacological society. Many of these collections are specialist collections of great value and it is expected that some of these eventually will be deposited in one of the public institutions.

The founding of the Nederlandse Malacologische Vereniging (Dutch malacological society) in 1934, with its own scientific journal *Basteria* (since 1936) has greatly influenced systematic and descriptive malacology in the Netherlands. The revival of malacology and collections, more particularly after World War II, is in no small measure due to the society.

3b. RIJKSMUSEUM VAN NATUURLIJKE HISTORIE

The Rijksmuseum van Natuurlijke Historie (National Museum of Natural History, although the collections are practically limited to recent zoological objects) in Leiden, founded in 1820, has a rather large and fairly important department of molluscs. This has been administer-

ed separately, i.e., separate from the other invertebrates non-insects, only since 1907. Before that time it has been jointly curated with these groups by the following officers in charge:

Dr. W. de Haan, a specialist on Crustacea and insects	1822-1846
Dr. J.A. Herklots, working generally on invertebrates	1846-1872
Dr. C.K. Hoffmann, working on echinoderms	1872-1875
Dr. J.G. de Man, a specialist on Crustacea and Nematoda	1875-1883
Dr. R. Horst, working on worms sensu lato	1883-1907

Some of these curators did some work on the Mollusca (Herklots, Horst). The first person solely in charge of the Mollusca was Tesch; from 1907 onwards the molluscs have been separately administered, although three times in the charge of officers also superintending other departments (1918-1923, 1923-1929):

Dr. J.J. Tesch	1907-1908
Dr. K.W. Dammerman	1908-1909
Dr. J.H. Vernhout	1909-1916
C.A. van der Willigen	1916-1917
Dr. R. Horst (for the second time, also in charge of other sections)	1918-1923
Dr. A.L.J. Sunier (also in charge of the Crustacea)	1923-1927
Dr. H.C. Blöte (also in charge of other sections)	1927-1929
Dr. C.G.F.H. Bayer	1929-1952
Dr. C.O. van Regteren Altena	1952-1973
Dr. E. Gittenberger	1968 to date

The famous malacologist M.M. Schepman (1847-1919) has long been associated with the Leiden museum (see also under Amsterdam museum). Schepman was not a scientist with a university education; malacologically he was a completely self-made man being held in high esteem by all leading specialists in the field. He published some 65 papers in the period 1874-1919, many of which were based on material from the then Dutch colonies (mainly those in Asia) in the Leiden museum. A considerable number of holotypes of taxa established by Schepman testifies to his activities. Together with Horst he wrote the first part of the catalogue of the mollusc collections of the museum (Horst & Schepman, 1894-1908, see below). Schepman's relation with the museum dates from 1872 (according to Gijzen, 1938: 328) and lasted until his death. His work was highly appreciated and the government bestowed the gold medal of merit on Schepman for his meritorious services to the national museum. This medal is only very rarely given and it signifies the importance of Schepman's work and the appreciation of the successive museum directors. A summary note on



Figs. 2-3. Two curators of Mollusca of the Rijksmuseum van Natuurlijke Historie, Leiden. 2. Dr. C.G.F.H. Bayer (1887-1956), curator 1929-1945 (photo ca. 1945). 3. Dr. J.J. Tesch (1877-1954), curator 1907-1908 (photo 1948). Photos courtesy Dr. L.B. Holthuis (archives Rijksmuseum van Natuurlijke Historie).



Fig. 4. Dr. C.O. van Regteren Altena (1907-1976), curator of molluscs Rijksmuseum van Natuurlijke Historie 1952-1973. Photo Chr. Hoorn, 1970.

Schepman with portrait is included in Van Benthem Jutting (1939: 181).

Tesch, Dammerman, Van der Willigen, Sunier and Blöte made their careers elsewhere. Tesch (1877-1954) (obituary by Van Regteren Altena, 1957c) became an expert on fisheries research, but returned to the museum as a voluntary worker after retirement. Tesch made a name for himself as a specialist in Pteropoda and Heteropoda, e.g., working out the pelagic gastropods of the Dana expeditions. Dammerman never actually worked on molluscs, but made a distinguished career in the tropics in the then Netherlands East Indies as head of the zoological museum and later director of the famous botanical gardens in Buitenzorg (Bogor, Java). Van der Willigen became a teacher of biology in a secondary school in Dordrecht and obtained his Ph. D. after having left the museum. Sunier, after having done some quite productive work in the mollusc department of the museum, was appointed director of the Amsterdam zoo, where he served with distinction under frequently very difficult circumstances. Blöte transferred to the entomology department of the museum, where he specialized in Hemiptera and Homoptera, ending his career as senior entomologist and assistant director of the Leiden museum.

Van Regteren Altena (1957b) published an obituary of Vernhout (1866-1955), who was quite productive in his short period, working on molluscs of the Netherlands, New Guinea, Surinam and the Dutch Antilles. Horst as a malacologist is mainly remembered for his catalogue in cooperation with Schepman (Horst & Schepman, 1894-1908; only one part was published, viz., that on the Prosobranchia and Polyplacophora). Bayer (1887-1956), essentially still a typical representative of the 19th century, gave his special attention to properly organizing the collections. In the process he wrote nine critical catalogues of prosobranch groups, catalogues which are now somewhat out of date, but which will remain the basis for much modern work. Much of the basic arrangement of the collections and the way these are curated are due to his meticulous and orderly work (see obituary by Van Regteren Altena, 1957a). Van Regteren Altena (1907-1976) (obituary by Van Bruggen, 1977; see also Van Benthem Jutting & Van Bruggen, 1972) brought a new impetus and the collections were greatly expanded, while the alcohol material received his particular attention. Altena will be remembered as a specialist on land slugs, on Dutch Recent and Quaternary molluscs, and on the molluscs of Surinam. He came to the Mollusca section from the Lepidoptera section of the museum, where he had worked and published in the period 1941-1952.

Unfortunately little has been written about the collections as such. There are very many scattered data in Gijzen (1938) covering the

period 1820-1915; it is to be regretted that this most valuable book is not indexed¹. Of course, as regards the Mollusca department data are incomplete. A host of detailed data is recorded in the printed annual reports of the museum (1883-1954, 1973 to date) and earlier records are covered in handwritten annual reports and the archives of the Leiden museum. Bayer (1950) has written a short and very concise note on the main malacological collections incorporated in the museum. Below an attempt is made to bring this list up to date.

The strength of the Leiden collections is mainly centred around four subjects, viz., (1) the Netherlands (also some Tertiary and Quaternary material; Dutch collections are kept separate from the general collections) and Europe, (2) Indonesia (formerly the Netherlands East Indies; collections from West New Guinea are particularly important), (3) Surinam and to a lesser degree the Netherlands Antilles (former Dutch colonies in South America and the Caribbean; much of the more recent material is derived from dredging operations during oceanographical exploration), and (4) alcohol material (rich collection particularly in land slugs, but also in Surinam material, etc.; ca. 10,000 lots in addition to thousands of unidentified and/or unsorted samples). Few major museums have sizeable wet mollusc collections. The Leiden collection may be among the largest in the world as regards this kind of material.

The following major private collections have been incorporated in toto (data additional to Bayer, 1950):

- Dr. C.O. van Regteren Altena (Europe, mainly non-marine);
- D. Aten (Europe, non-marine, much in alcohol);
- Dr. A.C. van Bruggen (worldwide and general, some in alcohol);
- J.P.M. Clerx (Europe, non-marine);
- Dr. E. Gittenberger (Europe, non-marine);
- Prof. Dr. A.D.J. Meeuse (Europe, non-marine);
- L.A.W.C. Venmans, Litt. D. (worldwide, mostly non-marine, much in alcohol);
- Dr. C.A. van der Willigen (worldwide and general);
- Mrs. M.E.A. Zwieberg-Waller (worldwide, marine).

Furthermore the important marine collection of the Dutch coast, formerly belonging to the "Comité ter Bestudering van de Mariene Fauna van Nederland", has now been incorporated in the Dutch collections. This specialized collection (much of it in alcohol) was already lodged in the museum, but had been kept technically separate until 1973.

In addition much important material, sometimes in large quantities, has been received or purchased from e.g.,

¹ A copy in the Leiden museum library has been fully indexed.

C. Altimira Aleu (Iberian Peninsula, Morocco and Fernando Po, non-marine, among which some material of A. Ortiz de Zárate; Iberian Peninsula, marine bivalves);

Dr. C. Beets (particularly marine material from the Red Sea and Suez Canal);

Dr. W. Backhuijs (Canary Islands, Morocco, Azores, non-marine);

W. Bergmans (particularly Australian bivalves);

Dr. R.A. Brandt (particularly freshwater material from southeast Asia);

A.S.H. Breure (Central and South America, non-marine, particularly Bulimulidae; much in alcohol);

Dr. A.C. van Bruggen (Africa, non-marine, particularly southern Africa);

L. Gasull (Iberian Peninsula, non-marine);

Dr. D.C. Geijskes (mainly South America, non-marine);

W.F. van Hell (various);

H. Odé (various);

Dr. H.E. Quick (Europe, non-marine, much in alcohol);

Rev. P.E. Schmutz, Rev. J.A.J. Verheyen and Rev. M. Vianney (Flores, Sumba, non-marine);

R.M. van Urk (Spain, marine);

Mrs. B.E. de Wilde-Duyfjes (West and northeast Africa, non-marine);

Dr. P. Wagenaar Hummelinck (mainly Caribbean islands, non marine).

The worldwide collecting trips of members of the staff of the museum have been a very important source of material. Van Regteren Altena collected extensively in Europe, the Canary Islands (1947), Libya (1959) and Surinam (1963, both marine and non-marine). Gittenberger has been very active indeed and has collected widely in Europe, giving his special attention to alpine species and cave dwellers. In Europe a lot of mainly marine collecting has been done in Scandinavia (coasts of Sweden and Norway, mainly dredging) and northwestern Spain (Ría de Arosa). Outside Europe attention has been particularly focussed on West New Guinea (1952-1959), Surinam (also after Van Regteren Altena's trip; mainly obtained by dredging from research vessels), and recently the western Atlantic Ocean (Madeira and surrounding areas, also from research vessels). Almost all museum staff members have contributed mollusc material in smaller or larger quantities and of varying importance; it is invidious to be specific here, but an exception is made for Dr. L.B. Holthuis (curator of Crustacea) and Dr. G.F. Mees (curator of birds).

The Leiden museum unfortunately has no critical type catalogue for the Mollusca section, but a recent survey by the author shows that it

contains only about 250 holotypes of nominal taxa. These have been described by the following authors (N.B. authors have been separated where there is joint authorship):

Aartsen, J.J. van	Lanza, F.
Adam, W.	Lea, I.
Altena, C.O. van Regteren	Loosjes, F.E.
Backhuijs, W.	Manga, M.Y.
Bayer, C.G.F.H.	Martens, E. von
Boeters, H.	Melvill, J.C.
Boettger, C.R.	Mol, J.J. van
Boss, K.J.	Nierstrasz, H.F.
Breure, A.S.H.	Pain, T.
Bruggen, A.C. van	Petit de la Sausaye, S.
Dautzenberg, Ph.	Rähle, W.
Delmas, D.	Riedel, A.
Fischer, P.H.	Rooy-Schuilin, L.A. de
Fischer-Piette, E.	Schepman, M.M.
Forcart, L.	Schmidt, F.J.
Gittenberger, E.	Schütt, H.
Giusti, F.	Solem, A.
Grimpe, G.	Spoel, S. van der
Herklots, J.A.	Swennen, C.
Hubrecht, A.A.W.	Tesch, J.J.
Hudec, V.	Testud, A.M.
Hummelinck, P. Wagenaar	Urk, R.M. van
Joubin, L.	Venmans, L.A.W.C.
Jutting, W.S.S. van Benthem	Verduin, A.
Kaas, P.	Vernhout, J.H.
Knudsen, J.	Vink, D.
Laidlaw, F.F.	Voss, G.
	Weinland, D.

In addition the collections contain many cotypes or syntypes, and paratypes. Cotypes or syntypes are nomenclatorially potentially very important, and paratypes are also of value to specialist workers. It was impossible to critically examine the material, so that the following list of authors is uncritical and most probably not complete; no separation has been made between cotypes, syntypes and paratypes, and also authors shown in the above list have been omitted here. The following authors are represented (N.B. authors have been separated in case of joint authorship):

Adams, C.B.	Jan, G.
Alonso, M.R.	Jeffreys, J.G.

Ancey, C.F.	Jones, K.H.
Archer, A.F.	Kobelt, W.
Baldwin, D.D.	Kormos, T.
Bavay, A.	Krauss, F.
Bequaert, J.C.	Kuiper, J.G.J.
Berthelot, S.	Lowe, R.T.
Boettger, O.	Marshall, J.T.
Brandt, R.A.	Morgan, J. de
Bullen, R.A.	Naegele, G.
Burch, J.Q.	Neumayer, M.
Burch, R.L.	Nevill, H.
Butot, L.J.M.	Ortiz de Zárate, A.
Clench, W.J.	Pallary, P.
Cockerell, T.D.A.	Pilsbry, H.A.
Coelho, A.C. dos Santos	Prashad, B.
Connolly, M.K.	Preston, H.B.
Cooke, C.M.	Putzeys, S.
Cooper, J.G.	Rensch, B.
Couthouy, J.P.	Rolle, H.
Cox, J.C.	Smith, E.A.
Cristofori, J. de	Sowerby, G.B. (III)
Da Costa, S.I.	Standen, R.
Dance, S.P.	Stearns, R.E.C.
Doering, A.	Sterki, V.
Dupuis, P.	Sturany, R.
Dall, W.H.	Sykes, E.R.
Ferris, J.H.	Tate, R.
Fez, S. de	Temcharoen, P.
Fruhstorfer, H.	Verdcourt, B.
Fulton, H.C.	Verkrüzen, T.A.
Garrett, A.	Wagner, A.J.
Gasull, L.	Walker, B.
Gude, G.K.	Webb, P.B.
Gould, A.A.	Weyrauch, W.
Haas, F.	Wollaston, T.V.
Hedley, C.	Wright, B.H.
Hirase, Y.	and others
Iredale, T.	

Type material is clearly indicated as such, but is incorporated in its appropriate place in both dry and wet collections.

The department of molluscs is under the direction of Dr. E. Gittenberger, ably assisted by Messrs. R. Vroom and J.H.W. Krom. Two

predecessors among these museum assistants have become widely known, viz., the late P.P. de Koning (who at times was virtually in charge of the collections), and Ph. van Hooven. The Leiden museum has a very large library and the literature resources of the Mollusca section may be counted among the best in Europe. Dr. Gittenberger works mainly on Palaearctic land molluscs with special interests in the Pupillacea and Helicellinae, and cave dwellers among land molluscs. A large amount of mollusc material has been sent out on loan to foreign workers in many countries so that many critical groups are being revised. Most of the Dutch work in connection with the European Invertebrate Survey (E.I.S.) is centred in the Leiden museum. Together with the director of the museum, Prof. Dr. W. Vervoort, and in collaboration with the Department of Systematic Zoology and Evolutionary Biology of Leiden university (Prof. Dr. J.T. Wiebes and Dr. A.C. van Bruggen), he supervises work by senior zoology students in the mollusc section. These students either work faunistically, or study Surinam marine molluscs or marine material from the Red Sea and Suez Canal assembled by Dr. C. Beets.

The museum also has the benefit of the services of a number of voluntary amateur workers, some in a semi-official capacity (W.H. Neuteboom, A. Verduin and A.W. Lacourt), others more loosely connected to the museum (e.g., R.M. van Urk).

Apart from a small number of zoologists working on a non-full time basis on Ph.D. theses in the section (among which are prominent Mrs. J. Meijer and Mrs. L.A. de Rooy-Schuiling), A.S.H. Breure as holder of a scholarship sponsored by the Foundation for the Advancement of Tropical Research (W.O.T.R.O.) works on the taxonomy sensu lato of Neotropical Bulimulidae. In addition to his teaching duties in the Department of Systematic Zoology and Evolutionary Biology of Leiden university, Dr. A.C. van Bruggen studies the terrestrial molluscs of Africa (particularly those of southern Africa) and the pulmonate family Streptaxidae; he is very interested in biogeography of terrestrial molluscs in general.

3c. ZOÖLOGISCH MUSEUM, AMSTERDAM

The Zoölogisch Museum (Zoological Museum, now officially called Instituut voor Taxonomische Zoölogie or Institute for Taxonomic Zoology) was founded in 1838 as part of the zoological gardens in Amsterdam. In that year the Zoölogisch Genootschap "Natura Artis Magistra" started with a modest collection of live animals and natural history specimens out of which grew the famous zoo and museum,

Until 1892 the museum was run by the zoological society at which time it was taken over by the municipality of Amsterdam to serve as a zootaxonomical institute for the University of Amsterdam. From 1854 there was a curator for the museum and after 1898 even two; these were together in charge of all zoological collections. Only from 1920 the number of officers was increased and for the first time a curator was solely in charge of the molluscs (to which traditionally had been added the brachiopods). Thus, as from 1920 there has been a separate malacological department. The following persons have been curators with the molluscs in their care:

A. Oltmans	1854-1873
R.T. Maitland (first appointment)	1856-1864
W.N.M. van de Blocquery	1874-1892
R.T. Maitland (second appointment)	1880-1893
Dr. J.T. Oudemans	1892-1900
Dr. Mia Boissevain	1898-1902
Dr. P.N. van Kampen	1900-1905
Dr. D. de Lange	1905-1907
Dr. L.F. de Beaufort	1905-1909
Dr. Nelly de Rooij	1907-1922
Dr. Neeltje L. Isebree Moens	1909-1910
Dr. J.H. Kruimel	1910-1914
Dr. C.J. van der Horst	1914-1916
Dr. M. Pinkhof	1916-1920
Dr. Wouter S.S. van Benthem Jutting (first curator of molluscs)	1920-1964
Dr. H.E. Coomans	1965 to date

Oltmans, Maitland, Van de Blocquery, Miss Boissevain, and Kruimel among the early curators are known to have worked on the molluscs; only Van de Blocquery did not publish on molluscs. M.M. Schepman was closely connected with the Amsterdam museum for many years, mainly when working out the Siboga expedition material. In 1920 his important private collection was bought for the museum. More data on Schepman are found on pp. 10 and 11. Two more persons have greatly contributed to malacology in the museum, although not in charge of the department of molluscs. These are Prof. Dr. H. Engel (curator 1922-1950, director 1950-1968; see Van Benthem Jutting, 1968, and Van der Veen, 1968), who worked extensively on sea slugs (Opisthobranchia), and Dr. S. van der Spoel (curator of Vermes since 1964), who specialized in planktonic gastropods.

During the period that Dr. Wouter (= Tera) van Benthem Jutting (in



Fig. 5. Dr. W.S.S. van Benthem Jutting, curator of molluscs of the Zoölogisch Museum, Amsterdam, 1920-1964. Photo J. van der Kamp, 1964.

1945 married to P.J. van der Feen, later curator of mammals at the museum) was in charge, the collections were completely reorganized and brought up to date. Her period as officer in charge of the molluscs was interrupted by an interlude in the tropics in Buitenzorg (now Bogor, Java) in the years 1930-1932, where she worked on the non-marine molluscs of the Indo-Australian archipelago. Indeed, this became her major speciality; she wrote monographs on the non-marine Mollusca of Java, Sumatra, Sumba, various Moluccan islands, and West New Guinea. Apart from that, her main work was devoted to the fauna of the Netherlands, for which she worked out and published all groups except for the Cephalopoda and as regards the opisthobranchs assisted by Engel. Her third main occupation was the history of conchology and malacology on which subject she wrote two general papers of great importance (Van Benthem Jutting, 1939, 1959) in addition to studies on J. Baster, L. Bomme, J.G. de Man, P.M. Regenfuss, G.E. Rumphius, and M. Slabber (see Engel & Van der Feen, 1964, and Van Regteren Altena, 1964; studies on Baster, Bomme and Slabber were published in 1967², 1969, and 1970 respectively). For many years she was ably assisted by I.A.J. de Wilde (1877-1955), no mean malacologist himself.

Information on the history of the mollusc collections of the Zoölogisch Museum is much less scattered and more completely and readily available than that of the Leiden museum. The important paper by Van Benthem Jutting (1939) covers the years from the start until ca. 1938, and an additional short article (Van Benthem Jutting, 1950) brings the earlier paper concisely up to date.

The importance of the Amsterdam collections, in size about equal to those in Leiden, may be mainly ascribed to four subjects, viz., (1) the Netherlands (this includes the collections of the Molluskencomité, of great importance to Dutch faunistics, see Coomans, 1968; Dutch material is kept separate from the general collections) and Europe, (2) Indonesia (formerly the Netherlands East Indies, both marine and non-marine material; the latter, however, of utmost importance as the basis of many papers), (3) Netherlands Antilles (former Dutch colonies in the Caribbean), and (4) alcohol material (rich collection, particularly in Siboga expedition specimens and sea slugs, etc.; estimated by Dr. Coomans to encompass a total of ca. 15,000 lots, which makes the Amsterdam museum wet collections probably rank among the largest in the world).

The following major private collections have been incorporated in toto (data additional to Van Benthem Jutting, 1950):

P. de Bruyne (Europe, general);

² The paper on Baster has C.M. van Hoorn as co-author.

L.J.M. Butot (Curaçao marine, Indonesia general);
 Dr. H.E. Coomans (mainly Europe and West Indies, marine);
 L. Coomans de Ruiter (Indonesia, marine);
 A.J. Jansen (Europe, general);
 J.G.J. Kuiper (Europe, non-marine, Pisidiidae and Sphaeriidae, worldwide);
 H.K. Mienis (worldwide and general);
 B. van der Most (Tertiary fossils of Europe, mainly France and Belgium);
 Dr. S. van der Spoel (various).
 In addition much important material, sometimes in large quantities, has been received or purchased from e.g.,
 Dr. C.O. van Regteren Altena (Netherlands and Europe, general);
 D. Aten (Europe, marine);
 W. Bergmans (West Africa, Mexico, marine);
 J. Blaauw (IJsselmeer, freshwater);
 C. Brakman (Zeeland, general);
 Dr. R.A. Brandt (Libya, non-marine, freshwater material from southeast Asia);
 Frater A. Broeders (Lesser Antilles, particularly St. Martin, marine);
 Rev. C.T. Cribb (Java, non-marine);
 Dr. E. Duarte (Uruguay, general);
 Dr. Mia I. Gerhardt (East Africa, Ceylon, marine);
 J.S.M. & G. Gerrits (West New Guinea, non-marine);
 F.S. & W.H. Harmon (Indo-Pacific, marine);
 Koninklijk Instituut voor de Tropen (Indonesia, marine);
 Mrs. Day Kimball (Europe, non-marine);
 Dr. M.J.A. de Koster (Solomon Islands, marine);
 R. & S. Martin (West Indies, marine);
 J.P. van Niel (Sumatra, general);
 P.L. van Pel (worldwide, marine);
 Dr. P. Pinchon (Martinique, general);
 L. de Priester (Indonesia, marine);
 A.R. Schouten (Europe, non-marine);
 D. Smits (West New Guinea, non-marine);
 Dr. S. van der Spoel (planktonic gastropods, worldwide);
 Mrs. G.A. Tammes-Bolt (Celebes, non-marine);
 Rev. M. Vianney (Flores, general);
 Dr. P. Wagenaar Hummelinck (Caribbean, general);
 Mrs. Mora Williams (Red Sea, marine);
 E. Wils (Conidae).

Collecting trips of staff members of the museum have always been a source of material for the Mollusca section. Prof.Dr. J.H. Stock has

particularly favoured this department with his numerous specimens.

The mollusc section of the Amsterdam museum has no type catalogue; types are not kept separate but are incorporated in both the dry and wet collections. The card index has indications as to type status of specimens but the sheer size of this index precludes a quick survey. The number of types is certainly considerably larger than that in the Leiden museum. The holotype list below is solely based on data supplied by Drs. Van Benthem Jutting and Coomans and the present author (N.B. authors have been separated in case of joint authorship):

Adam, W.	Kruimel, J.H.
Altena, C.O. van Regteren	Kuiper, J.G.J.
Baker, H.B.	Loosjes, F.E.
Bavay, A.	Martens, E. von
Bergh, R.	Nierstrasz, H.F.
Boissevain, M.	Pelseneer, P.
Breure, A.S.H.	Petit de la Sausaye, S.
Butot, L.J.M.	Pfeiffer, L.
Coomans, H.E.	Prashad, B.
Dautzenberg, Ph.	Schepman, M.M.
Delmas, D.	Spoel, S. van der
Engel, H.	Stork, H.A.
Fischer-Piette, E.	Tesch, J.J.
Jutting, W.S.S. van Benthem	

The bulk of the holotypes is from species described by Van Benthem Jutting (mainly Indonesia, non-marine) and from those described from the Siboga collection, viz., those of Adam, Bavay, Bergh, Boissevain, Dautzenberg, Nierstrasz, Pelseneer, Prashad, Schepman, Stork, and Tesch.

Syntypes and paratypes are available in large numbers and of a variety of authors. It is impossible here to enumerate these authors because of the bulk of the card index; there is no system of metal tabs indicating type cards as was formerly used in the Leiden museum.

The department of molluscs is under the direction of Dr. H.E. Coomans, assisted by R.C. Moolenbeek and H. Hulsche. Their predecessor was J.H. Geerling. Dr. Coomans works mainly on Marginellidae (worldwide) and West Indian marine molluscs; he is also very interested in the history of malacology and pearl formation among molluscs. Apart from the museum library resources, the Amsterdam museum also houses the library of the Dutch malacological society and the famous Artis library is in the same building as the mollusc department. Senior zoology students have undertaken a lot of useful collection work resulting in revisions of certain groups.

Dr. S. van der Spoel, although in charge of the Vermes section of the museum, is a world authority on planktonic gastropods (Heteropoda and Pteropoda) on which he has written two major treatises. His malacological work is clearly reflected in the museum collections.

The museum also has the benefit of a number of honorary collaborators. The senior among these is, of course, Dr. Van Benthem Jutting; the others are L.J.M. Butot, F.S. & W.H. Harmon, K.M. de Jong, J.G.J. Kuiper, H.K. Mienis, and E. Wils.

3d. PALAEOONTOLOGICAL COLLECTIONS

Molluscs figure prominently in palaeontology. There has been no lack of interest in this phylum in Dutch palaeontological collections and among Dutch palaeontologists. Some of the latter, such as K. Martin, have achieved world fame.

The foremost palaeontological institution in the Netherlands is the Rijksmuseum van Geologie en Mineralogie (National Museum of Geology and Mineralogy) in Leiden. This museum arose as an offshoot of the Rijksmuseum van Natuurlijke Historie. The Leiden geology museum is the creation of one of Holland's greatest palaeontologists, Prof.Dr. J.K.L. Martin (1851-1942). In 1877 Martin was appointed to the newly created chair of geology and mineralogy, crystallography and palaeontology at Leiden university. In 1878 he was entrusted with the care of the geological and mineralogical collections of the Rijksmuseum van Natuurlijke Historie, to which were added the palaeontological collections which previously had formed part of the zoological section of the said museum. Gradually the separation between the zoological and geological-mineralogical sections became more marked and thus eventually a separate Rijksmuseum van Geologie en Mineralogie came into being. In 1892-1894 the geological collections were moved into a separate building. When Martin's successor, Prof.Dr. B.G. Escher, retired the chair of geology, etc. was split up, and Prof.Dr. I.M. van der Vlerk was appointed director of the geological-mineralogical museum. A complete separation from the university geology department only came into being in 1963 when Dr. C. Beets became the museum's director. The museum was moved to the present premises in 1966.

Martin retired from his directorate and professorship in 1922, but continued to work and publish until his death in 1942 (see Van Regteren Altena, 1946, Escher, 1931, and Gerth, 1944). Although Martin worked as a palaeontologist in almost all major groups of the animal kingdom, he will be mainly remembered as a specialist in molluscs,



Fig. 6. Prof. Dr. J.K.L. Martin (1851-1942), director of the Rijksmuseum van Geologie en Mineralogie, Leiden, 1878-1922. Photo courtesy Dr. G.E. de Groot (ca. 1905, archives Rijksmuseum van Geologie en Mineralogie).

particularly Tertiary and Quaternary shells of Indonesia. Many of his large number of papers treated molluscs, either taxonomically or stratigraphically. During Martin's directorship of the Leiden geology museum (1878-1922) and under his successors as well much material was acquired and a large proportion of this consisted of fossil molluscs. Many people worked on these specimens or deposited collections of fossil shells on which they had worked in the museum:

Dr. C.O. van Regteren Altena	M.M. Schepman
Dr. C. Beets	Dr. F.A. Schilder
Dr. H. Gerth	Dr. F. Toulà
Dr. W. de Haan	Dr. F. Vogel
Miss H. Icke	Mrs. C.H.T. Wagner-Gentis
Dr. P.G. Krause	Dr. G.E.G. Westermann
Dr. Anneke Pannekoek	Dr. G.G. Wissema
	and others

Of these Beets, Gerth, miss Icke, Krause, Martin, and Vogel were on the staff of the museum for varying periods of time. De Haan was the first curator to be in charge of various groups of invertebrates (among which the molluscs) in the Leiden natural history museum before the geological museum was founded. He worked in the museum from 1822 tot 1846 (see sub Rijksmuseum van Natuurlijke Historie) and described some fossil shells (ammonites); therefore De Haan may have been the first, albeit part-time, government palaeontologist in the Netherlands. Schepman again features here; more data on this important worker are to be found on pp. 10-11 and 20. At present Dr. P.J. Hoedemaeker works on ammonites from Spain and A.W. Janssen on the marine molluscs of the Neogene of Europe. The main mollusc holdings of the museum are Indonesian Tertiary and Quaternary, northwestern European Neogene and (Maastricht) Cretaceous material. However, there is also a lot of other fossil mollusc material. Dutch material has been partly kept separate and in general all specimens are now being entered in a registration system so that automatic computer retrieval of data becomes possible. No separate type catalogue is as yet available, the number of fossil molluscan types is considerable. Martin described 1087 taxa of fossil molluscs and almost all his types are at the museum.

The Rijks Geologische Dienst (National Geological Survey) has two centres, the headquarters in Haarlem and the Geologisch Bureau voor het Mijngebied (Geological Office for the Mining District) which includes the Museum der Rijks Geologische Dienst at Heerlen. The geological survey holds important collections of the Netherlands and western Europe in addition to some other material. The Heerlen centre spe-

cializes in the Carboniferous and Cretaceous. Dr. H.W.J. van Amerom (Heerlen) conducts research on Carboniferous bivalves, while G. Spalink (Haarlem) works on marine molluscs of the Neogene of the Netherlands and adjoining countries.

Another of our foremost workers on fossil molluscs has been Dr. P. Tesch (1879-1961), director of the geological survey in the years 1918-1946. P. Tesch, a brother of J.J. Tesch (see p. 14), published 13 mollusc papers among which a list of Quaternary non-marine molluscs of the Netherlands (see Grutterink, 1945, Steenhuis, 1945, and Thia-dens, 1961).

Almost all university geology departments have palaeontological collections of varying importance. The geological museum of the University of Amsterdam (curator J.H. Werner) has particularly important fossil mollusc material; this institution may be ranked third as regards fossil mollusc collections in the Netherlands. University geology departments are attached to the following universities: Amsterdam (University of Amsterdam and Free University), Delft (Technological University), Groningen, Leiden, Utrecht and Wageningen (Agricultural University). Some of these departments have deposited (parts of) their collections in the Leiden museum.

Three more public collections have much fossil mollusc material in their charge, viz., Teyler's Museum (Haarlem), the Natuurhistorisch Museum (Maastricht) and the Zeeuws Museum (Middelburg).

Teyler's Museum is the oldest museum in the Netherlands (1780). It is unfortunately little known, particularly abroad, although its palaeontological collections are of great importance (also for non-molluscs). These collections contain many molluscs (see e.g., Van Regteren Altena & Möckel, 1967). Dr. C.O. van Regteren Altena (see Van Benthem Jutting & Van Bruggen, 1972, and Van Bruggen, 1977) was curator of the geological, mineralogical and palaeontological cabinet of Teyler's Museum in the years 1946-1976. The Natuurhistorisch Museum in Maastricht has important collections of the Dutch Cretaceous, while the Middelburg museum contains, e.g., much marine material reworked from the Neogene deposits of Zeeland. Dr. W.S.S. van Benthem Jutting (see sub Zoölogisch Museum, Amsterdam) has been associated with the Middelburg museum, especially since 1965 (see Van Benthem Jutting, 1976).

Both the Rijksmuseum van Natuurlijke Historie (see chapter 3b) and the Zoölogisch Museum (see chapter 3c) have sizeable collections of Neogene material from the Netherlands. For purposes of comparison studies on Neogene molluscs may be done to advantage in a zoological rather than a palaeontological museum.

Furthermore there is a number of smaller regional museums spread

all over the country; some of these have quite considerable collections of fossils among which many molluscs. It is impossible to here enumerate these institutions and their collections; the reader is referred to the official publication (De Nederlandse Musea, 1976).

3e. OTHER COLLECTIONS AND WORKERS

In a number of the smaller, regional natural history museums there are not inconsiderable collections of molluscs, sometimes only of local or Dutch, but also of foreign material. Some of these museums specialize in molluscs or are even exclusively devoted to molluscs (shells). No taxonomic research is conducted in these institutions. The interested reader is again referred to the official government publication on the museums in the Netherlands (De Nederlandse Musea, 1976).

The many, sometimes very important, private collections have already been mentioned in chapter 5 on the history of the Dutch malacological society. There are, of course, also private collections belonging to persons outside the malacological society. In a few cases private collections serve as a (partial) base for taxonomical research.

Some descriptive malacological work is done outside the major museums, mainly occasionally in some university departments of zoology, in the Rijksinstituut voor Natuurbeheer (National Institute for Nature Management, Arnhem and Leersum: L.J.M. Butot), in fisheries research institutions, in ecological institutions, and elsewhere. As shown in the introduction to this chapter, it is not always possible to sharply delimit descriptive and experimental malacology; many experimental workers indulge in a certain amount of descriptive work before tackling their particular experimental problems.

It is, of course, not possible to cover all descriptive malacological work in the Netherlands in the context of the present paper. It only serves as a general framework so that the reader may gain an impression of what has been done and what is being done locally in this particular branch of science.

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