

The history of the study of the Dutch recent Mollusca

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BEFORE THE FRENCH REVOLUTION

The first scientific contributions to malacology in the Netherlands were made by two doctors, ANTONIUS DE HEIDE (1684) on the anatomy of *Mytilus edulis*, and STEPHAN BLANKAART (1688) on the copulation, spawning and life history of *Cepaea nemoralis* and *Limax maximus*¹⁾.

In this same period fall the dissections by SWAMMERDAM († 1680, published posthumously in 1737) of *Helix pomatia*, *Cepaea nemoralis*, *Arion*, *Limax*, *Planorbis*, *Lymnaea*, *Viviparus*, *Unio*, and *Sepia officinalis*.

During the 18th century a number of publications appeared with relation to the disastrous epidemic occurrence of *Teredo navalis* round the year 1730. From a malacological standpoint the most important publications were those by SELLIUS (1733), BEUKMEER (1733), DE BRUYN (1735) and BASTER (1739), dealing with the anatomy of the shipworm. The molluscan nature of this animal was not yet fully understood at that time.

BASTER who practised as a M.D. in Zierikzee, continued his marine biological research in the following years and published the results between 1757 and 1765. Among many other marine organisms he described a shell of *Buccinum undatum* with a Hermit Crab, and the egg capsules of the Whelk, further *Doris fuscata*, *Littorina littorea*, *Ostrea edulis*, *Aeolidia papillosa*, *Mytilus edulis*, *Nya arenaria*, *Rissoa dimincta*, *Cardium ruscicum*, *Macra crassatella*. He was the first person who actually observed a periwinkle, *Littorina littorea*, spawning. His work stimulated his countrymen BOMME (1769, 1771, 1778) and SLABBER (1778) to similar observations on a few Nudibranchs and *Pholias*.

¹⁾ Notice: (1) The history of palaeontological research concerning Mollusca is not considered. (2) No attention is paid to studies of Dutch scientists on foreign molluscs, or to studies of foreigners on Dutch molluscs. (3) The full titles of all the publications mentioned in this paper are not given. Most of them can be found in the three volumes on Mollusca in the series "Fauna van Nederland" (1933, 1936 and 1943). Only the newer publications (and a few older ones) are given in the List of References at the end of the present article.

Apart from this anatomical work by a few scientists there occurred in the Netherlands among intelligent and well-to-do amateurs a wide interest in collecting natural history objects, chiefly from the tropics, in curiosity cabinets. Among these objects shells were very much favoured as their beautiful shape and colour greatly appealed to the imagination of the amateur collectors. The general character of these collections was purely one of "pleasure and delight"; from a scientific viewpoint they were of some importance as accumulations of the multitude of different forms of mollusca.

THE 19TH CENTURY

During the dramatic events of the French Revolution and the occupation of the Netherlands by Napoleonic forces scientific work was temporarily suspended, and many exquisite 18th century cabinets of natural history were lost or destroyed.

After the restoration of the Kingdom of the Netherlands in 1815 scientific work was resumed and soon made good progress, but malacology was but little considered and dwindled into nothing as compared with the extent to which it was fostered in France, Germany and England, where scientific expeditions were equipped, modern museum classification introduced and malacological standard works were started.

In the Netherlands VAN HALEM (1820), VAN SWINDEREN (1825-1831), BENNET & VAN OLIVIER (1826), WARDENBURG (1827), VAN DEN ENDE (1828) and MAITLAND (1854, 1897) compiled check lists of the Dutch mollusca and their distribution, and HERKLOTS (1859, 1862) published a descriptive "Fauna". VERLOREN (1837) investigated the anatomy of various pulmonates.

All this work was purely descriptive, taxonomic and faunistic, no comments on physiology, embryology or ecology being included. One cannot help thinking that these authors had little mutual contact, and that there was no central institute or person to coordinate their various efforts.

In the second half of the 19th century it was again the shipworm, *Teredo navalis* which, during a new epidemic outbreak, initiated a new series of investigations of shipworms and their control. Under the leadership of W. VROLIK (1860-1869) and under the auspices of the Royal Academy of Sciences BAUMHAUER (1866, 1869) investigated the control of *Teredo* and the preservation of wood, while HARTING (1860) studied the boring mechanism.

The foundation of the Nederlandse Dierkundige Vereniging (Netherlands Zoological Society) in 1872 and the new academic

charter of 1876, by which the study of biology became independent from medicine, greatly promoted scientific research by individual students and the collaboration between fellow workers.

Thus we see that in the last quarter of the 19th century various dissertations and other publications of academic quality dealt with malacological topics: JENTINK (1875) on naked Pulmonates, SLUITER (1878) on the gills of Bivalves, VAN BEMMELLEN (1882) on the shell of Chitons, HORST (1883) on the development of *Orvea edulis*, CARTIE (1885) on Lamellibranchs. SCHEPMAN (1874 and various later years) although not being a professional biologist, produced some excellent pieces of work, anatomical as well as taxonomical.

Good instances of early team-work are the investigations carried out by various zoologists under the leadership of HOEK (1883-1884) on the natural history of oysters in the Oosterschelde and on the general fauna of this estuary. Another example of team-work was the collaboration of a hydraulic engineer, a zoologist and a geologist on the question whether the fishery for shells along the North Sea coast can be harmful to the beaches and the dunes (VAN DIESEN, HOEK, LORJÉ, 1896).

Summarizing the general tendencies of malacological research in this period we may take it that anatomical, embryological, faunistic and economic purposes were its most prominent characteristics.

THE 20TH CENTURY TILL 1934

The 20th century brought an explosive development in natural history study in the Netherlands, mainly due to the efforts of two head-schoolmasters in Amsterdam, E. HEIMANS and J. P. THIJSSÉ. These two men started in 1896 a popular monthly *De Levende Natuur* in which any person who did some sort of field work was invited to publish his results. At the same time help and advice were offered to any one who wanted information on a particular region, an organism or a problem. After having been the privilege of purely academic circles for so long the study of nature was now presented in popular form for the benefit of intelligent amateurs and lovers of animal and plant life, who were at the same time stimulated to develop their own work in natural history.

During the following years a continuous stream of observations and questions flowed in to the editors of *De Levende Natuur*, and so successful was this enterprise that the journal has never suffered from any slackening of interest and is as vigorous as ever today, dividing its space equally between amateurs and university experts. Among the papers there are numerous titles dealing with malacology.

The growing interest and knowledge of the molluscan fauna of the Netherlands induced a couple of persons to found a Comité ter Bestudering van de Molluskfauna van Nederland (Committee for the Study of the Mollusc Fauna of the Netherlands) in 1915. This Comité was confined to a maximum of 10 members, most of whom were professional zoologists. The main activities of the Comité were: 1. collecting data on the mollusca found, alive or dead, in the Netherlands and stimulating other persons to do the same, and 2. inaugurating two card indices of the Dutch mollusca, one arranged according to their taxonomic position and another according to the municipalities where the species were found. Members were: M. M. SCHEPMAN, Miss J. SCHOLTEN, Dr J. H. VENNHOUDT, J. DEN DOOP, M. PINKHOF, Jhr W. C. VAN HEURN, Dr W. G. N. VAN DER SLEEN, later on a few others, as C. DRUYVESTEYN and the author of the present paper. Although the Comité was a very unobtrusive organization it collected a considerable amount of very useful information, now and then publishing an up-to-date account, the last one in 1947. In this way the Comité stimulated generations of collectors and field naturalists and laid the foundations for a future malacological society.

A special field of malacological research was covered by the scientists of the Rijksinstituut voor Visserij Onderzoek (State Institute for Fishery Investigations) to which several Dutch zoologists of international fame were attached. Thus HOEK worked on oyster- and mussel-research (1902) and on the ecology of the shellfish in the Dutch Wadden Sea (1911). His successor REDDEKÉ studied the food of *Orvea edulis* and *Mytilus edulis* (1902, 1911) and the natural history of *Teredo maeotara* (1912). TESCH the Cephalopoda of the North Sea (1908), DELSMAN the cell-lineage and further development of *Mytilus edulis* (1911) and *Littorina obtusata* (1912, 1914), HAVINGA the oyster- and mussel-culture (1929, 1932) and, later, KORRINGA (1940 and later years) the propagation and protection of oysters and mussels. In the Institute for Bacteriological Inspection of Oysters HEYMANN (1914) wrote a dissertation on the feeding of the European flat oyster.

In university circles some zoologists took a malacological subject for their doctor thesis (KEER, 1903; VAN DER WILLLIGEN, 1920; GROENWEGEN, 1924; ADAM, 1933). Among the pupils of H. J. JORDAN in Utrecht some physiological dissertations appeared by BEGMANN (1924), VONK (1924), KRJGSMAN (1925, 1928), DE MAREES VAN SWINDEREN (1927), JISSLING (1930), WOLVEKAMP (1932), ROMIJN (1935) and POSTMA (1935). These investigations were not directly meant as a contribution to the knowledge of the Dutch

fauna, although the authors used Dutch molluscs for their dissections and experiments.

A few examples of successful cooperation in the study of Dutch fauna and flora in these years were the Meyendel Onderzoek in the dunes near The Hague (Mollusca by VAN HELL, 1930), the Naardermeer Onderzoek (Mollusca by VAN REEGEREN ALTEMA, 1936, and VAN BENTHEM JUTTING & KUIJPER, 1942) and the Zuiderzee Onderzoek. This last project was carried out during the years 1920 to 1922 and again from 1927 to 1942 in order to ascertain how the changes in the fauna and flora of the Zuiderzee took place when this basin was converted from a brackish water estuary into a freshwater lake (Mollusca by HAVINGA 1922, 1936 and VAN BENTHEM JUTTING, 1922, 1936, and 1954). Ecological observations were put more into the foreground than in previous enterprises, although almost no experimental work was carried out.

In the year 1920 the Nederlandse Jeugdbond voor Natuurstudie (Netherlands Youth League for the Study of Nature) was inaugurated. This organisation includes young naturalists, under 23 years of age, who study nature during excursions, camping parties, working groups etc. and who publish their results in one central periodical "Amoeba" and a few local pamphlets. The collections of marine organisms, chiefly molluscs, originally belonging to members of the Jeugdbond, the so-called Strandgroep, was deposited in, and presented to the Rijksmuseum van Natuurlijke Historie at Leiden.

In this period some more or less successful efforts were made to publish popular books on the shells of the Netherlands: DORSMAN (1911, 1919, 1926), DORSMAN & DE WILDE (1929), HEINSIUS & JASPERS (1913), HOKREUS DE HAAS (1933). The two first mentioned works are chiefly adaptations after foreign books, the last two are original. A check-list by VERHOUT (1916) of the Dutch mollusca in the collection of the Rijksmuseum van Natuurlijke Historie at Leiden forms a useful basis for classification and distribution.

In concluding this section it can be stated that the study of molluscs in the Netherlands in this period made important progress towards a better understanding of anatomy, embryology, physiology, faunistics and ecology, thus building a foundation for further research.

THE 20TH CENTURY SINCE 1934

After some preliminary correspondence the Nederlandse Malacologische Vereniging (Netherlands Malacological Society) was founded in 1934. From the very beginning amateurs and professional zoologists joined in their efforts to make the Society a centre for all those

who are interested in malacology, recent as well as fossil. A duplicated circular, the Correspondentie Blad, containing lists of members, proceedings of the Society's meetings and excursions, exchange column, abstracts of new publications, short scientific notes etc., is issued bi- or tri-monthly to all members. Two years later the journal "Basteria", named after Dr JOB BASTER of Zierikzee (see before) was instituted and is now (1959) in its 23rd volume. It contains scientific papers in Dutch, German, English or French on any subject related to malacology. Subscription to "Basteria" is not obligatory, membership with or without the journal being possible.

The Society has proved to be a great success; the number of members amounting now to about 200 of whom 90% are subscribers to "Basteria". In addition many institutions and private persons abroad are subscribers, who are not members of the Society. In the third place the journal is sent on an exchange basis to several addresses.

By this exchange and through many donations the Society is building up a malacological library which is still on a modest scale, but which will—as we hope—become an important centre of malacological literature.

A few years ago the extensive card catalogues of the Mollusken Comité referred to above, were transferred to the Netherlands Malacological Society. The collections went mostly to the Zoological Museum, Amsterdam, as the Society does not keep a collection of its own.

In the Zoological Museum at Amsterdam where the present author became an assistant in 1920, and later curator of mollusca, the study of the Dutch fauna was much helped by the great mass of information available in the files of the Mollusken Comité. These catalogues were most helpful in editing the three volumes in the series Fauna van Nederland (Gastropoda Prosobranchia et Pulmonata, 1933, by VAN BENTHEM JUTTING; Gastropoda Opisthobranchia, Amphineura and Scaphopoda, 1936, by VAN BENTHEM JUTTING & ENGEL and Lamellichranchia, 1943, by VAN BENTHEM JUTTING). The volume on Cephalopoda has not yet appeared.

A volume on marine mollusca by KAAS & TEN BROEK appeared in 1942.

Similar national enterprises were initiated in France (Faune de France, Mollusques terrestres et fluviatiles by GERMAIN, 1930-1931), Germany (Fauna Mitteleuropas, Mollusca by EHRMANN, 1933; Tierwelt der Nord- und Ostsee, Lamellichranchia by HAAS, 1926, Pteropoda and Opisthobranchia by HOFFMANN, 1926, Scaphopoda by VAN BENTHEM JUTTING, 1926, Aculifera by NIERSTRASZ, 1929, Prosobranchia by ANKEL, 1936, Basommatophora by BOETTGER, 1944, Cephalopoda by JAECKEL, 1958; Tier-

welt Deutschlands, Mollusca by DAHL, 1925), Switzerland (Invertebrés de la Suisse, Gastéropodes by MERMOD, 1930), Denmark (Danmarks Fauna, Landsnegle by STEENBERG, 1911, Ferskvandsbløddyr by MANDDAHL-BARTH, 1949) and — after World War II — in various other countries. The British Isles in the 19th century had already produced FORBES & HANLEY (1848-1852), JEFFREYS (1862-1865) and TAYLOR (1894-1921), followed, in the 20th century, by ELLIS (1926) and STEP (1927) and by various smaller check lists and keys. Germany also had its early malacologists in CLESSIN (1884 and 1887) and GEYER (editions in 1896, 1909 and 1927).

The influence of the Netherlands Malacological Society in stimulating in this country the interest of amateurs and of professional students can hardly be overestimated. A list of all the private collections in the Netherlands appeared in the Correspondentie Blad of May 1952 and February 1953. Specialists such as F. E. LOOSJES (Clausiliidae), J. G. J. KUIJPER (Pisidia), and VAN REEGTHERN ALTENA (naked Pulmonates), P. KAAS (Loricata) and C. BRAKKMAN (recent and fossil mollusca of Zeeland) have acquired world wide fame. Many others are observing, studying, cultivating, dissecting, collecting or drawing molluscs on a more modest scale in their own field of interest.

A special investigation was devoted by MEUSE & HUBERT (1949) to the mollusca occurring in greenhouses in the Netherlands. These species are partly native animals, partly immigrants from various regions of the world. The authors tried to explain how these immigrants have reached their new biotope, and how they were influenced by it.

Another factor which greatly influenced the study of marine mollusca in the Netherlands was the appearance of the doctor thesis of VAN REEGTHERN ALTENA (1937). This book gave the reader an insight into the conditions controlling the differences in distribution of marine molluscs along the Dutch coast and it helped the younger generation to classify their recent and fossil shells.

As in the previous period a number of scientists worked on mollusca in university laboratories, independently of museums or the Malacological Society, on problems of fundamental zoological significance which had no relation to the Dutch fauna other than that Dutch mollusca were used as the experimental animals. In the laboratory of comparative physiology at Utrecht under H. J. JORDAN (see before) numerous results of investigations of neuro-muscular function, of digestion, vascular and respiratory processes in *Helix pomatia*, *Limax* and *Amudonta* were produced. In later years RAVEN and his students, also at Utrecht, in admirable team-work, carried out experiments on the embryology and development of *Lymnaea stagnalis* by means of chemicals, radiation, electric current, etc.

The most recent series of investigations was started a few years ago by LEVER and his collaborators in Amsterdam on neurosecretion in Basommatophora and on comparative morphology of freshwater mollusca.

In the State Institute for Fishery Investigations chief attention was focussed on oyster- and mussel-culture, propagated in lectures and publications by KORRINGA and his collaborators. They even succeeded in producing two highly instructive films, one on oyster-culture and one on mussel-culture.

Under the leadership of VERWEY a number of students from various universities worked in the Marine Biological Station at Den Helder, studying problems of distribution, migration, hibernation, chemical preference, diet, life cycle, parasitism etc. in marine molluscs: TINBERGEN (1939) on *Septia officinalis*, KRÖGER (1940) on *Cardium edule*, MAAS GEESTERANUS (1942)* on *Mytilus edulis*, KUBNEN (1942) on *Mytilus edulis*, TINBERGEN & VERWEY (1945) on *Loligo vulgaris*, VERWEY (1949) on migration and (1952) on *Cardium edule* and *Mytilus edulis*, WILLEMSEN (1952) on *Mytilus edulis* and *Cardium edule*, STEHOUWER (1952) on *Aeolidia papillora*, BAGGERMAN (1953) on *Cardium edule*, BRAAMS & GEBIEN (1953) on Nudibranchia, TAMMES & DRAL (1955) on *Mytilus*, BRAKKMAN (1955) on *Littorina obtusata*, VAN DONGEN (1956) on *Littorina obtusata*, and KRISTENSEN (1957) on *Cardium edule*.

For many years a commission for the control of liver-fluke disease in sheep and cattle in the Netherlands has been investigating the life history of *Lymnaea truncatula* and other freshwater snails. This led to a careful study of the biology of these animals, not only with a view to the radical extermination, but also from the point of view of basic biological science.

At the request of the Staatsbosbeheer a number of young biologists undertook, in the years 1937 to 1939, a biosociological survey of the State Nature Reserves in the Dutch Wadden Islands. A list of the molluscs, with localities and ecological details, was published by VAN BENTHEM JUTTING (1956).

Genetic studies on molluscs have so far been given little attention in the Netherlands. Of recent years DE RUTTER at Groningen made experiments with *Cepaea nemoralis*. The results have not yet been published.

So far synecological work has been little practised in the Netherlands, and never on experimental lines. Some attempts have been made only in recent years: MÖRZER BRUVYS (1947), VAN DER DRIFT (1950), KORRINGA (1951), but a wide field of research lies unexplored and would certainly yield an important contribution to a

better knowledge of the interrelations between mollusca and their environment.

In summing up the chief characteristics of this last period, we are confronted with an extensive accumulation of facts in almost every section of malacology. These various branches have proceeded so divergently that it becomes more and more difficult to arrive at a synthetical integration on problems of structural and physiological mechanisms, or to develop a tentative scheme for investigation in the future.

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Geschiedenis van het onderzoek der Nederlandse recente

Mollusken

(Samenvatting)

door

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VOÓR DE FRANSE REVOLUTIE

De oudste Nederlandse wetenschappelijke malacologische bijdrage dateert van 1684 toen ANTONIUS DE HEIDE de anatomie van de mossel, *Mytilus edulis* onderzocht. Kort daarna, 1688, beschreef BLANKAART de copulatie, het eienleggen en de levenscyclus van *Cepaea nemoralis* en *Linnaeus maximus*.

Ook het onderzoek van SWANKMABRAM aan diverse Nederlandse mollusken valt in deze tijd, maar zijn werk werd eerst in 1737 postuum gepubliceerd.

In de 18e eeuw zien wij een groot aantal geschriften, sommige natuurwetenschappelijk, andere religieus van opzet, betreffende een plotseling massaal optreden van paalworm, *Teredo navalis* (SELLIUS, 1733; BEIKMEER, 1733; DE BRUYN, 1735; BASTER, 1739).

BASTER, die als medicus te Zierikzee practiseerde, onderzocht tussen 1757 en 1765 verscheidene zee-organismen, w.o. de Wulk, *Doris fusca*, *Littorina littorea* (de eerste waarneming van het eienleggen van de Alikruik), *Osreva edulis*, *Mytilus edulis*, *Mya arenaria*, *Cardium rusticum*, *Macraea crassatella*, *Aeolidia papillosa*, *Rissoa di-juncta*. Door zijn werk werden ook twee andere Zeeuwen BOMME en SLABBER tot dergelijk onderzoek geïnspireerd.

DE 19e EEUW

Na de restauratie van het Koninkrijk in 1815 kwam wetenschappelijk werk in Nederland weer spoedig op gang, maar de malacologie was daarbij nog slechts in geringe mate betrokken.

Enkele faunistische lijsten door VAN HALLEM (1820), VAN SWINDEREN (1825-1831), BENNET & VAN OLIVIER (1826), WAARDENBURG (1827), VAN DEN ENDE (1828) en MARITLAND (1854, 1897) zagen het licht, HERKLOTS (1859, 1862) publiceerde een beschrijvende fauna, en VERLOREN (1837) onderzocht de anatomie van enige pulmonaren.

In de tweede helft dezer eeuw vond weer een paalworm-epidemie plaats. Het onderzoek daarover werd geleid door VROLIK (1860-1869) bijgestaan door BAUMHAUER (1866, 1869) en HARTING (1860).

De oprichting van de Nederlandse Dierkundige Vereniging en het nieuwe academische statuut van 1876, waarbij de studie der