

A REVIEW OF THE TAXONOMICAL AND ECOLOGICAL STUDIES ON NETHERLANDS' ALGAE

by

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The earliest account of the Netherlands' Algae appeared in 1781 in D. de Gorter, Flora VII Prov. Belgii foederati indigen. Here, however, in the Algae lichens and liverworts have been incorporated. The true Algae, of which 35 are enumerated, are principally marine, though also aërophytical and freshwater Algae are among them.

Some fifty years later F. A. W. Miquel gave a revision of the Netherlands' Algae, with keys and descriptions in Latin and Dutch, in van Hall, Flora Belgii septentrionalis. We find them in two tribes: 1. *Algae Chloricae*, to which belong the bluegreens, the diatoms, the green Algae, the Charophytes; and 2. *Algae Chromicae*, to which belong the brown and the red Algae. At that time about 100 species from this country were known, which had been collected in Friesland, Groningen, Texel, Ameland, N. and S. Holland, Utrecht, Veluwe and along the coast of the Northsea (often drifted ashore). Of most of the Algae Dutch names are given. The first investigator, who occupied himself thoroughly with the indigenous Algae was R. B. van den Bosch, medicinae doctor. In 1853 he gave a general survey of all the indigenous Algae then known, freshwater as well as marine, in the Prodrômus Florae Batavae. The list contains about 500 species. It stands to reason that the nomenclature is quite antiquated, the classification being based on Kützing's Species Algarum. Instead of with *Cyanophyceae*, *Chlorophyceae*, etc., we have to count with *Heterocarpeae* and *Isocarpeae*. The first tribe including the marine red Algae, and the second all the others. The subordo *Cryptospermeae* for instance contains the families *Mesogloeaceae*, *Batrachospermeae*, *Chaetophoreae*, *Lemanieae*, a combination which strikes us now as illogical and chaotic. Van den Bosch had his identifications verified by Fr. T. Kützing, "the law-maker of algology", as he called him, who was one of the most prominent algologists of that time.

Many species of Kützing have been based on specimens from Holland, sent by van den Bosch. The materials for the enumeration had been brought together by the members of the "Nederlandsche Botanische Vereeniging". Special mention deserve H. J. Molkenboer and C. A. J. A. Oudemans, who collected in the neighbourhood of Leyden, but most of all van den Bosch himself, who made an inventory of the Zeeland Algae. Fossil diatoms are added to the enumeration. Among these are a number of new species described by P. Harting. In 1854 W. F. R. Suringar, then 22 years old, gave a critical review of the algological knowledge of that time in general, and more specially of that of the Netherlands. The manuscript had been awarded the gold metal in the competition held by the Philosophical Faculty of the Leyden University. It is preserved now in the Rijksherbarium. Suringar's classification in some minor respects deviates from Kützing's. Suringar is aware of the fact that many "species" of Algae might be nothing but states of development of other species. However, he emphasizes that as algology was still in its infancy the first necessity was to obtain a knowledge of the forms, as they are found in Nature, and of their natural relations. The last part of the manuscript gives a survey of about 150 algae collected by the author in spring and summer of 1854, 50 of which were new to the Netherlands. The collections, presented afterwards to the Nederlandsche Botanische Vereeniging, were made in Wassenaar, Leyden, Friesland and along the West coast of the Zuiderzee. This algological study served as a basis for Suringar's thesis in 1857, in which he created a number of new forms and one new species: a *Cyanophycea*, which afterwards proved to be a synonym. Additions to this work appeared in the coming years, adding a number of new indigenous algae, freshwater as well as marine. A collection of marine algae, for instance, was made by him with the aid of his students in Den Helder. In 1874 a short communication by Suringar announced the discovery of a new parasitic alga, preliminary called *Drepanothrix cingens*.

In 1861 C. M. van der Sande Lacoste and Suringar gave a list of new indigenous Algae, and described moreover new species of *Cladophora*, *Characium*, *Chytridium* and *Synedra*.

In 1870 Th. Sprée gave an additional list of indigenous Algae. Suringar supplied a list of about 600 Algae in the "Flora van Nederland" in "Algem. Statistiek van Nederland" in 1870. It is the last general survey of the Netherlands' Algae up to this time. It is noteworthy that in this list the *Characeae* are separated as a

subclassis from the subclassis *Algae*.

Further additions to the Netherlands' Algae flora, freshwater as well as marine, came from C. A. J. A. Oudemans (1882) and A. A. Weber-van Bosse (1886, 1891), who added to the first of her lists the results of her investigations on the spermogones of *Melobesia Lejolisii*.

Excursions to Boxmeer (Suringar), Nijmegen, Ameland (J. Heimans), Terschelling (J. Th. Koster) added to our knowledge of local algal floras, as previously already the long list of Algae published by Th. A. H. J. Abeleven in the "Flora van Nijmegen" had done. Th. J. Stomps described the algal flora of the Naardermeer (1923—1928), from which lake a number of species new to the Netherlands were discovered by him. Moreover, the algal flora of Netherlands' lakes have amply been studied, sociologically, ecologically as well as systematically by H. C. Reedeke (Zwanenwater, N. Holland, 1903), who was awarded the "Hollandsche Maatschappij der Wetenschappen"-price for this work, by A. H. Blaauw (Lake of Rockanje, Voorne, 1917), by B. Havinga (Zuidlaardermeer, Groningen and Drente, 1919), and by W. Beijerinck (moorland bogs in Drente, 1927), three of whom wrote their doctor theses on these studies. Beijerinck's paper contains apart from his own extensive investigations, a list of all the 860 indigenous freshwater Algae known up to that time, to which 183 species new to the Netherlands are added.

Freshwater Algae (also diatoms) from pools in the dunes of the Isle of Voorne have been studied by J. Hofker and C. van Rijninge (1932).

The marine flora of larger Algae, especially of Den Helder has been investigated amply and critically by A. C. J. van Goor (1923). His studies were ecological, biological, sociological and taxonomical, as well as phytogeographical. He gives a very useful key to the genera. Apart from a good number of species new to the country, van Goor described a new species (perhaps but a form), *Fucus intermedius*. A special ecological problem has lately been studied by J. S. Zaneveld (1937), who made experiments on the vertical distribution in the *Fucaceae* zone. Data on *Fucus* in the Netherlands can be found in Stomps' paper on *Fucus* species (1911).

Some popular articles on marine Algae from the coast of the Northsea are dealing with autochthonic Algae as well as with Algae, that are drifted ashore. W. H. Heinsius and J. Jaspers moreover gave a key for macroscopical identification. Heimans (1916) described the marine Algae from IJmuiden and den Helder

morphologically and biologically. J. G. Sloff studied the marine Algae along the Zeeland estuaries, and made observations on their vertical distribution (1925—1926).

Not only the marine algal flora of the Northsea, but also that of the Zuiderzee being turned into the IJsselmeer, drew the attention. Here the problem was the influence of the gradual decrease of the salt concentration, and of the disappearance of the tides. A. van der Werff and W. Feekes worked on the Algae of Wieringen, the last-named chiefly sociologically. In 1922 van Goor had given an ecological, sociological and taxonomical record of the Algae, and in 1937 K. J. Hocke Hoogenboom gave a similar survey of the Algae after the enclosing of the Zuiderzee on 28 May 1932. Of the 50 marine species known from the Zuiderzee before, 9 only had still maintained themselves in 1935 and but 5 freshwater species, new to the Zuiderzee had been found.

Plankton Algae from the Northsea as well as from the Zuiderzee have been studied by P. J. van Breemen (1905, doctor thesis) and van Goor (1920—1925). The first author created a new species, *Coscinodiscus biconicus*, abundant in the Zuiderzee. This diatom species has been investigated biologically by J. Hofker (1928).

In the Zuiderzee $\frac{2}{3}$ of the phytoplankton belongs to the diatoms, bluegreens are scarce.

The plankton Algae found in the rivers and canals of the Netherlands have been studied by Redeke and van Goor. The same investigators gave a general survey of fresh- and brackish water plankton. In 1935 about 650 planktonic species of Algae were known from this country.

Lately a publication appeared (M. A. van Overeem, 1937) on airplankton collected over the Netherlands at an altitude of 100—2000 m. Only 9 species of Algae, belonging to the *Cyanophyceae* and the *Chlorophyceae*, have been collected.

The wellknown symbiosis of *Blasia pusilla* with *Nostoc punctiforme*, but also with other Algae, has been observed though rarely, near Venlo by A. J. M. Garjeanne (1931).

The *Flagellatae* of this country had the special interest of Redeke (1919) and van Goor (1925), the first of whom discovered a new *Peridinea*, *Amphidinium pellucidum* (1935).

The *Desmidiaceae* of the Netherlands have been studied first by Suringar (1877) and afterwards by Heimans (1919, 1925). Desmids together with freshwater *Chlorophyceae* from little pools in the dunes of Meijendel (Wassenaar) have been studied by J. F. Obbes (1930). According to the author, some of these Algae must

have been transported attached to the feet of migrating birds.

Lately the Netherlands' *Charophyceae* have been revised by H. D. Verdam (1938), showing 23 species known from this country.

Netherlands' *Diatomeae* have been studied morphologically by van Goor (1920, 1924, 1925), biologically by Hofker (1928, 1930) and systematically by van der Werff. The last mentioned author made an inventory of the diatoms of the Zuiderzee during and after (1931, 1937), as van Goor (1922) had done before the enclosing. However, van Goor studied the plankton forms only. But 30, perhaps even but 20, had remained out of the 80 species and varieties; 17 new ones, however, had made their appearance. *Coscinodiscus biconicus*, though still extant, seemed to be disappearing. Lately a paper appeared on freshwater diatoms by Beyerinck (1939).

On fossil diatoms from the Netherlands has been worked by Suringar (1901) and C. Brockmann (1928).

Batrachospermum moniliforme has amply been described by Garjeanne (1915) from a brooklet near Venlo.

In this survey articles on Netherlands' Algae in popular periodicals have for the greater part been neglected.

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