

## Five scientists on excursion – a picture of marine biology on Helgoland before 1892

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**ABSTRACT:** Five scientists on excursion – a picture of marine biology on Helgoland before 1892. The picture, of which several variant poses with minor differences exist, is a photograph taken on Helgoland in September, 1865. The original is to be found in the collections of the Ernst-Haeckel-Haus in Jena. The photograph shows only a few objects and fewer persons, but they are arranged like a bouquet: in front, collecting vessels; behind, grouped around a table, five scientists, Dohrn, Greeff, Haeckel, Salverda, Marchi. They hold up their catching nets like insignia, identifying their basic activity. This photograph is a unique document for the marine biological research on Helgoland before 1892. Furthermore, it illustrates a time and place for the birth of the idea of establishing the world's most famous marine biological station, the Stazione Zoologica di Napoli.

The picture of which we shall speak is of two kinds. Firstly, it is a real one – a photograph – taken on Helgoland in September, 1865; secondly, it may be taken as a metaphor for marine biology on Helgoland before the foundation of the "Biologische Anstalt" in 1892, as well as what transpired thereafter, and in fact for the beginning of plankton research worldwide.

It symbolizes the long series of botanists and zoologists<sup>1</sup> who, fascinated by marine organisms and their life patterns, came to the island for weeks, even months, at a time. Here, they had the opportunity of studying living objects, as though they were in the middle of the ocean.

The photograph is identified by Mielck (1930) as the oldest one demonstrating the existence of marine scientists on Helgoland and is often used as an exceptional illustration in books on Helgoland (e.g. Prigge, 1977) as well as in papers concerned with the Biologische Anstalt Helgoland (e.g. Kinne, 1965; 1980) or with historical marine biology (e.g. Groeben, 1984). It shows only a few objects and fewer persons but they are arranged like a bouquet (Fig. 1).

In front, collecting vessels, a bucket and glass jars, the likes of which are still used in food stores, for example. Five scientists are grouped around a table: to the left is seated Matthijs Salverda, one year later Professor for Botany and Zoology in Groningen; on the right, Pietro Marchi from Florence; standing on the left is Anton Dohrn, at that time still an entomologist, encountering marine fauna for the first time here on Helgoland – as Theodor Heuss (1962) points out in his biography on Dohrn.

In the middle is Richard Greeff (1829–1892) at that time a private lecturer in Bonn and later Professor for Zoology and Comparative Anatomy in Marburg/Lahn (Uschmann,



Figs 1 and 2. Five scientists on Helgoland in September 1865. Seated, left to right M. Salverda and P. Marchi; standing, left to right, Anton Dohrn, Richard Greeff, and Ernst Haeckel. Two poses: Fig. 1, Salverda's head is supported by his right arm, his hand against his temple; Fig. 2, Salverda's hand is propping his jaw. The originals are kept at the Ernst-Haeckel-Haus in Jena

1966). On the right is Ernst Haeckel, who had already been on Helgoland in 1854 and, thanks to his excursions to the Mediterranean, was the most experienced of the five scientists in working with marine organisms.

The photograph, of which – as Dr. Erika Krauß has told me – three variant poses with minor differences exist, measures  $10.8 \times 12.2$  cm: somewhat smaller than a postcard. The originals are to be found in the collections of the "Ernst-Haeckel-Haus" in



Fig. 2

Jena. Dr. Salverda's head is supported by his right arm; his hand is against his temple. Figure 2 shows the second pose. Now Salverda's hand is propping his jaw. The third pose is totally blurred ("verwackelt" in German, as Mrs. Krauße wrote to me). The photographer is unknown<sup>2</sup>, but it looks plausible that the photographs were taken with Haeckel's camera, since very similar photographs exist, taken a year later (1866), on the Canary Isle Lanzarote.

One of these (Fig. 3) shows Haeckel sitting on the left, and on his right the Russian zoologist, Nikolaus Miclucho-Maclay (1846–1888). This, as well as the Helgoland



Fig. 3. Ernst Haeckel, seated left, and Nikolaus Miklucho-Maclay on the Canary Isle Lanzarote in 1866. Original: Ernst-Haeckel-Haus in Jena

photographs, shows the scientists holding up their large catching-nets like insignia identifying their basic activity.

One is reminded the "Butterfly catcher" by Carl Spitzweg (1808–1885), a German painter of the early Victorian period (Fig. 4). And this makes sense as will presently be demonstrated.

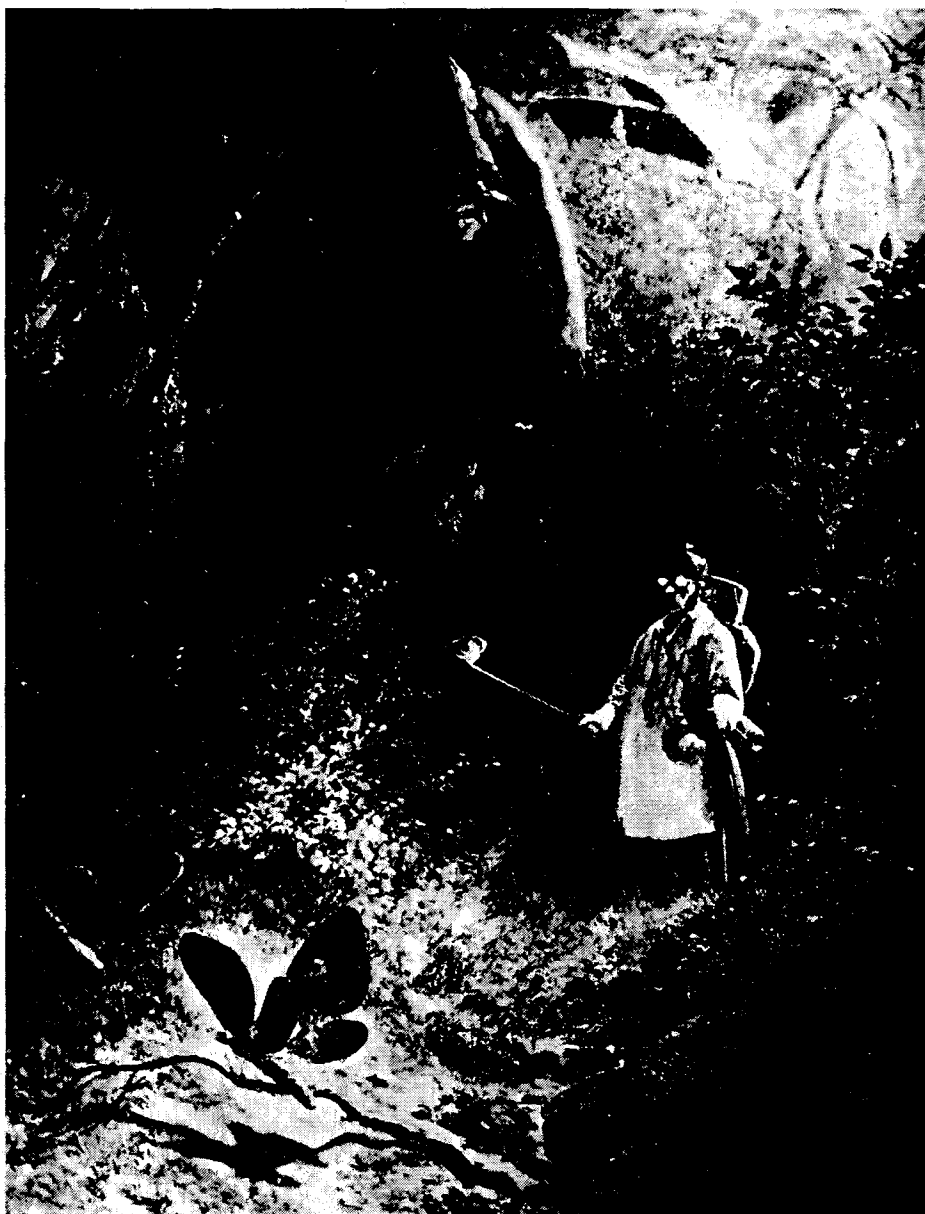


Fig. 4. Carl Spitzweg, "The Butterfly Catcher", painted about 1840

As mentioned above, Haeckel had already been on Helgoland in 1854, together with Johannes Müller (Fig. 5). It was he who introduced Haeckel to the simple method of collecting living material with fine nets and observing it under the microscope. Nine years earlier, Müller – at that time a new approach – had microscopically studied living



Fig. 5. Johannes Müller, in summer 1857. Taken from Koller (1958)

organisms in the seawater brought by fishermen (Koller, 1958). Thus, in order to obtain abundant hauls, he had the idea of using nets on poles. These nets for the collection of what Müller called "pelagic drift"<sup>3</sup> were first made from cotton muslin then later from bolting silk. These were both used by millers (in German "Müller") for sifting flour and therefore already coincidentally called "Müller-Gaze", "gaze" referring to the old commercial town, Gaza, in the Gaza Strip.

Haeckel (1921), in his book „Italien Journey. Letters to the Bride 1859/1860" (p. 161) – describes Müller's method as follows: "While the barque, through light oarstrokes, moves slowly forwards, one steadily holds the net half-submerged, and filters – as it were – a great volume of sea-water through it. From time to time the net is taken out, tipped over, and, inside out, rinsed out into glass and bucket filled with sea-water, where the most delicate little creatures – caught in the mesh – are again freed, and fall to the bottom. This sediment in the receptacles, from which the remaining clear water is decanted afterwards at home, is now a whole inexhaustible source of the richest and most remarkable delights of nature, in which an enormous number of curious and most interesting small creatures, but particularly every kind of larvae, are contained; yes, even at times consisting of these alone". (Translated from the German)<sup>4</sup>.

The construction of these Müllerian draw nets, which have, to this day, retained their original name, had obviously been stimulated by nets used formerly for catching butterflies. Müller himself, in a letter from the 2nd of September 1846, wrote: "... I heartily enjoy it, when the rising sun from behind the dune shines onto bed and face. Then I attempt to wake the young people, and soon one sees us going fishing with our small butterfly-nets." (Cited by Koller, 1958, p. 165, and translated from the German).<sup>5</sup>

Hence, Adolf Bückmann and his collaborators (1959, p. 12) were quite right in calling the island of Helgoland "the cradle of planktonic research".<sup>6</sup>

Müller, however, was not the first to set up fine nets for collecting plankton organisms. Already in 1761, Peter Forskal (1736–1763)<sup>7</sup>, one of Linnaeus' favourite students, skimmed off superficial layers in the Mediterranean Sea (Schlee, 1974, p. 188). Some sixteen years later, the Danish naturalist, Otto Friedrich Müller (1730–1784), sampled seawater with nets and, using this method, discovered, for example, the dinoflagellate *Ceratium tripos* in 1777 (Gran, 1912, cited in Taylor, 1980, p. 512). Adelbert v. Chamisso (1781–1838) in 1815 on the "Rurik" and Darwin in 1833 on the "Beagle" used nets for pelagic sampling.

Nets, today characterized by a collecting vessel (as for example is typical for the Hensen-net, still in use on Helgoland), had already been used by the British physician and amateur naturalist J. Vaughan Thompson (1779–1848). Already in 1828, he fastened a collecting-box at the end of a cone-shaped net of fine gauze (Fig. 6). In his very first sample, Thompson discovered the larvae of barnacles and hence could demonstrate that the barnacles are crustaceans and not molluscs, as was previously believed to be the case (Burton, 1970). The width of mesh of Thompson's net was a little too large to retain microalgae, as Thorson (1972) emphasizes. Hence, microalgae were discovered first in 1848 by the Danish botanist Anders Sandoe Ørsted (1816–1872), on a voyage to Central America.

Thirty-six years after his first Helgoland excursion, Haeckel admits: "Never will I forget the amazement with which I admired the swarming of the pelagic vitreous animals ... the motley of ornamental medusae, opalescent ctenophores, sagittae, swift as

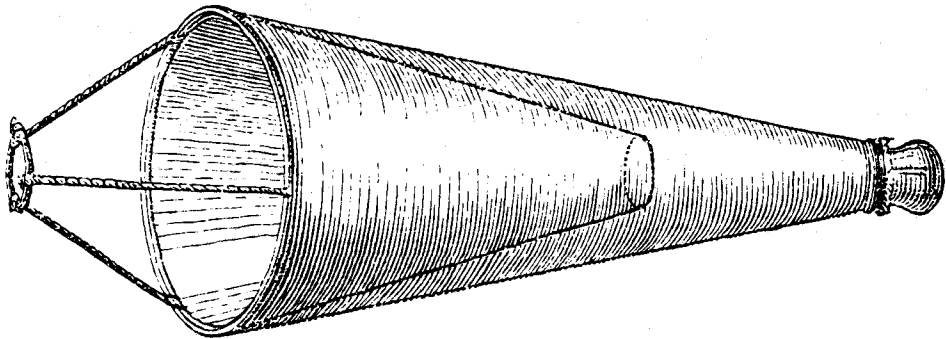


Fig. 6. The drawing illustrates the construction of J. Vaughan Thompson's plankton net. Taken from Burton (1970)

an arrow, serpentine *Tomopteris*, the masses of copepods and schizopods, of pelagic larvae of worms and echinoderms." (Cited in Bölsche, 1900, p. 52; translated from the German)<sup>8</sup>.

Johannes Müller was proved right later, when he told Haeckel in 1854: "As soon as you have entered into this pelagic wonderland, you will see that you cannot leave it." (Haeckel 1890, translated from the German by G. W. Field, 1893, p. 573).

Haeckel analyzed the surface layers of the sea around Helgoland and also looked for living organisms on the shores of the main island and the dune; he investigated oyster beds, lobster cages and brown algae that were cast ashore. All the species he had found he compiled in what he called: "Index animalium marinorum auctumno (17. 8.–17. 9.) 1854 ab Ernesto Haeckel collectorum et observatorum ad insulam Helgoland." (Cited in Schmidt, 1926, p. 98). The index comprises 200 entries.

Haeckel also carried out investigations on the egg of the Scomberesoces, particularly of *Belone vulgaris* (today *Belone belone*), a pelagic swarming fish, which can still be found near Helgoland, dead specimens sometimes being cast ashore. One year later, in 1855, the results of these investigations were published in Müller's *Archiv für Anatomie, Physiologie und Wiss. Medizin*, and constituted Haeckel's first zoological publication.

In 1865 Haeckel collected numerous hydromedusae, of which – nova specie – *Polycanna germanica* was later included in his most famous monography "The System of Medusae" (1879) (Fig. 7). Richard Greeff studied the polychaetes; in his netting samples he discovered a new species, which he designated *Tomopteris helgolandica* (Greeff, 1879).

Anton Dohrn's experiences on Helgoland were of quite another character. In October 1909 – as Christiane Groeben (1982, p. 90) points out – Haeckel wrote to Reinhard Dohrn, Anton Dohrn's son: "44 years have passed now since your father, as one of my outstanding pupils, collected and investigated the marine fauna together with me at Heligoland. When we both together each day had to carry a heavy box with four big glasses from the beach into the boat, the project of the Zoological Station was born (August 1865)" (Translated from the German by Groeben).

Hence, this photograph has been a unique document for the marine biological research on Helgoland before 1892 for over half a century. Furthermore, it illustrates a



260. Species: **Polycanna germanica**, HAECKEL; nova species.

Tafel XIV, Fig. 1—3.

*Crematostoma germanicum*, HAECKEL, 1877; Prodröm. System. Medus. Nr. 250.

*Rhegmatoles germanicus*, HAECKEL, Atlas; Taf. XIV, Fig. 1—3.

Species-Diagnose: Schirm abgeplattet, mützenförmig, doppelt so breit als hoch. Magendecke fast eben, wenig oral-convex. Magen sehr weit und flach, seine Basis von  $\frac{3}{4}$  des Schirmdurchmessers. Schlundrohr spindelförmig oder glockenförmig, lang und eng, bis zur Velar-Ebene hinreichend. Mund mit 50—70 schmal lanzettlichen, gekräuselten Lappen. Radial-Canäle zahlreich (50—70), fast in der ganzen Länge von linearen Gonaden eingenommen. Tentakeln sehr lang (mehrmals länger als der Schirmdurchmesser), eben so viel als Radial-Canäle, an deren Enden. Randbläschen sehr zahlreich (200—400), je 4—5 zwischen je 2 Tentakeln; jedes mit 2 Paar gegenständigen Otolithen.

Spezielle Beschreibung: *Crematostoma germanicum* habe ich nur einmal (im September 1865) in der Nähe von Helgoland beobachtet, ein Schwarm von einigen Hundert Personen, welche sehr gleichmässige Grösse und Form zeigten. Fast bei allen Personen war die Zahl der Radial-Canäle dieselbe, wie die Zahl der Mundlappen und Tentakeln (zwischen 50 und 70 variirend). Die Bildung der zahlreichen Randbläschen war ganz dieselbe wie bei *Crematostoma funginum* (Taf. XIV, Fig. 6, 7). Der Körper war vollkommen glashell und farblos.

Grösse: Schirmbreite 60—80 Mm., Schirmhöhe 30—40 Mm. — Ontogenie unbekannt.

Fundort: Deutsches Meer; Helgoland, HAECKEL.

Fig. 7. Haeckel's description of the hydromedusa *Polycanna germanica*; discovered at Helgoland, 1865. From Haeckel (1879)

time and place for the birth of the idea of establishing the world's most famous marine biological station on the sea – to be realized only much later: the Stazione Zoologica di Napoli.

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## NOTES

- 1 See Florey (this volume).
- 2 The well-known Helgoland-photographer Franz Schensky is sometimes mentioned in connection with the photograph (Mielck, 1930; Kinne, 1965). However, being not born until 1871, Schensky cannot have taken it. Possibly the prints used came from his collections.
- 3 Victor Hensen's designation "plankton" was not introduced until 1887.
- 4 "Während die Barke durch schwachen Ruderschlag langsam fortbewegt wird, hält man das Netz beständig halb eingetaucht und filtriert so gleichsam eine große Menge Seewasser durch. Von Zeit zu Zeit wird dann das Netz herausgenommen, umgekehrt und der nach außen gewendete Innenteil ausgespült in dem mit Seewasser gefüllten Glas und Eimer, wo dann die in den Maschen hängengebliebenen *feinsten* Geschöpfchen wieder frei werden und zu Boden fallen. Dieser Bodensatz in den Gefäßen, von dem das überstehende geklärte Wasser nachher zu Haus abgegossen wird, ist nun eine ganz unerschöpfliche Quelle der reichsten und merkwürdigsten Naturgenüsse, indem er eine Unmasse der merkwürdigsten und interessantesten Geschöpfchen, besonders aber Larven von aller Art, enthält, ja, zuweilen ganz allein daraus zusammengesetzt ist."
- 5 "... ich bin herzlich froh, wenn die hinter der Düne aufgehende Sonne ins Bett und ins Angesicht

- schaut. Dann pflege ich die jungen Leute zu wecken und bald sieht man uns mit unseren kleinen Schmetterlingsnetzen zum Fischen gehen."
- 6 "Die Insel Helgoland ist recht eigentlich die Wiege der Planktonforschung."
- 7 There is some uncertainty as to the years of his birth and death. Other dates – given in etymological dictionaries as 1732–1763, 1736–1768, 1738–1768 – seem less plausible.
- 8 "Niemals werde ich das Erstaunen vergessen, mit dem ich zum erstenmale das Gewimmel der pelagischen Glastiere bewunderte . . . dieses bunte Durcheinander von zierlichen Medusen und schillernden Ctenophoren, von pfeilschnellen Sagitten und schlangenartigen Tomopteris, diese Masse von Copepoden und Schizopoden, von pelagischen Larven der Würmer und Echinodermen."

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