

PALAEONTOLOGICAL TYPE COLLECTIONS IN NORWAY: DEVELOPMENT AND ORGANIZATION

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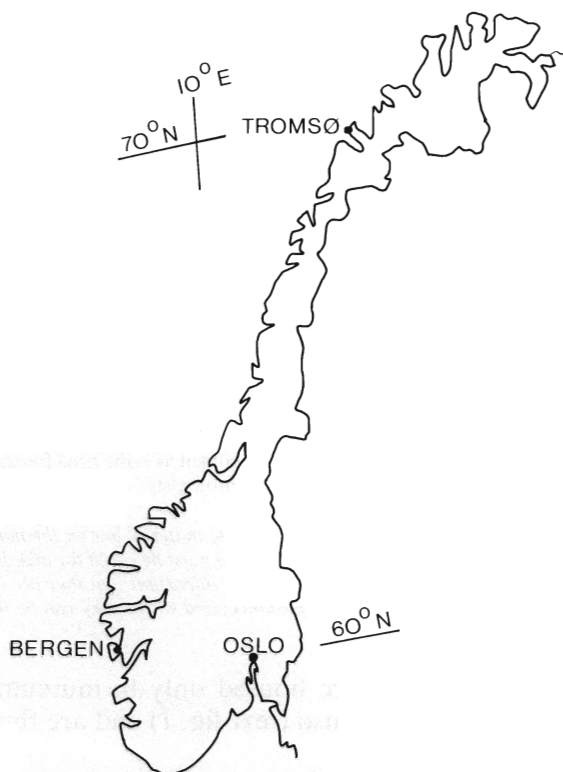
ABSTRACT. Type collections of fossils in private hands and in local museums do not exist in Norway, where the recognition of the permanence of university museums means that types are deposited there. The organization of the type collections in the Palaeontological Museum of the University of Oslo is discussed in detail. The philosophy behind the need for primary and secondary type collections is outlined as is the need for the centralization in Norway of type material collected by both national and foreign palaeontologists.

... The value of a museum collection depends not on the amount of material but on the number of original specimens, i.e. those specimens which have been examined and described. These must be cared for and displayed in such a way as to be freely available for all who wish to examine them. It is therefore important that they are labelled and ordered in such a way that there can be no doubt as to their scientific importance, and where they can be found (Heintz 1930, p. 265; translated by Bruton).

TYPE fossil collections in Norway are housed only in museums belonging to the universities of Bergen, Oslo, and Tromsø (text-fig. 1) and are thus the responsibility of trained staff.

It is recognized that these museums have a permanence which other institutions do not have, and the establishment of type collections in university geological departments and governmental institutes (Norwegian Petroleum Directorate, Norwegian Polar Institute, and the Geological Survey) is not considered practicable. Private museums with important collections of fossils do not exist in Norway and with the exception of the two other above-mentioned museums, it is generally taken for granted that type specimens will be deposited in the University Palaeontological Museum, Oslo. This is not surprising since from 1909 the Museum collections have been the major responsibility of the country's only Professor of Palaeontology, together with a succession of curators. The museums in Bergen and Tromsø have never had curators of palaeontology. This, together with the fact that both are situated in poorly fossiliferous areas means that their collections have never been as important as those in Oslo, whose early collections dating from the 1850s consisted almost entirely of local Lower Palaeozoic fossils. Local fossils still make up more than two-thirds of the collections but since the early 1900s these have been added to by collections from the Arctic regions obtained by various Norwegian expeditions, beginning with Fridtjof Nansen's (1861–1930) expedition to Khabarova in 1893 and followed by others including those of Per Schei (1875–1905) and Olaf Høltedahl (1885–1975) to Svalbard (Spitsbergen), Greenland, Ellesmere Land, and Novaja Zemlja. These form the basis of what is today a valuable polar collection containing fossils of all groups and ages.

Fossil collections in Oslo have grown considerably since, as part of the old University 'Mineralcabinett', they occupied about 900 boxes in 1853. Among these were



TEXT-FIG. 1. Location of museums in Norway with type fossil collections.

collections of the earliest Norwegian collectors including Baltazar Mathias Keilhau (1797–1858), Christian Peter Bianco Boeck (1798–1877), Michael Sars (1805–1869), and later Theodor Kjerulf (1825–1888), and Waldemar Christofer Brøgger (1851–1940). When taken over by Johan Aschehoug Kiær (1869–1931), following his appointment as the first Professor of Palaeontology in 1909, the collection numbered about 31 000 boxes. Today this number has increased to well over 160 000 catalogued specimens, of which at least around 7000 are type and figured specimens found in 320 publications dating from 1833 to the present.

The type collection in Oslo

The establishment of a type collection in Oslo started in the 1920s when, inspired by the type philosophy of Rudolf Richter in Germany (Richter 1925) and Charles Schuchert in America, it was decided to identify the primary types among the existing collections, which until then had been used for both teaching and display. The system of organization outlined by Anatol Heintz (1930) is with some modification that which is used today. Thus it is still our current practice to separate type collections from the remaining Museum collections (*General Collections*), but today type specimens are neither open to the public nor are they on display. Instead they are housed in a special locked room and carefully arranged in a series of metal cup-

boards according to date of publication. In each cupboard the types, either as individual specimens or on hand specimens of rock, are kept in cardboard trays arranged according to author's name, date, and plate and figure number of the publication in which they occur, and placed on a series of pull-out metal trays. A copy of the publication is also included for ease of reference during examination of the collection by museum staff or by visitors. Together in the box with the specimen are found:

1. Label (red for holotype and other unique primary types, green for paratype and syntype) with the following information:

- (a) Specimen number which also occurs on the specimen and is to be found in the museum catalogue and type collection card index.
- (b) Name of fossil.
- (c) Name of locality and stratigraphical data.
- (d) Date of publication and plate and figure data.

2. All previous labels, small notes on identification, and other information which may have followed the specimen during its history. Both label and other papers are placed in a plastic envelope to prevent soiling and damage.

A type specimen will remain in its original collection and cupboard and if it should be refigured or described in a subsequent year, then a cardboard tray containing label, data, and cross-reference is placed in the cupboard for that year. There is no problem of keeping track of type specimens when they are kept separate and curated in the way described above, for each collection is assigned its own cupboard and tray(s). In addition type data can be found in one of three additional sources: (1) the general museum catalogue in which specimens are listed by accession number together with date of collection, locality, and horizon; (2) a type catalogue arranged alphabetically according to author and publication with plate and figure data; and (3) a type collection card index. The latter contains all data, and the examples in text-fig. 2 illustrate the cards used for the trilobite *Ceratopyge forficula* (Sars, 1835).

The specimen with accession number H2690a was first described by M. Sars (1835) as *Olenus forficula*, from stage 3a β (Ordovician), St. Olav's gate, Oslo. The fossil is to be found in the collection of Sars and Boeck for 1833 (text-fig. 2A). In the index, the card is arranged alphabetically according to this generic name.

As is often the case, the same specimen is likely to be subsequently figured by another author. In this case the specimen of Sars has been figured twice since 1835, by Brøgger in 1882 and Størmer in 1940. These data are then added to the original card (text-fig. 2B). In both cases these subsequent authors assigned the specimen to *Ceratopyge* and this information is to be found on two new cards (text-fig. 2C, D). Note the cross-references on all cards.

This system shows in a simple way, the history of the fossil since its first description and where in the type collection it can now be found.

So far we have not been convinced of the need for computerizing type data, although it is clear that use of the computer would be invaluable for taking stock of the much larger general collection.

The *primary type* collection contains not only holotypes, paratypes, syntypes, lectotypes, and neotypes, but all those fossils which have been *figured* in scientific publications over the years. For this reason the term *original collection* is probably the more correct.

A H2690a *Olenus forficula* Sars Ligger i saml. Sars & Boeck 1833
(=Ceratopyge forficula)

3αβ St. Olavs gate, Oslo.

M. Sars 1835:

"Über einige neue oder unvollständig bekannte Trilobiten".

Pl. 8, fig. 1a (H2690b Pl. 8, fig. 1d, 1f?)

Isis von Oken. 1835, H, 1-12.

B H2690a *Olenus forficula* Sars (=Ceratopyge forficula)

3αβ St. Olavs gate, Oslo

M. Sars 1835:

"Über einige neue oder unvollständig bekannte Trilobiten".

Pl. 8, fig. 1a (H2690b Pl. 8, fig. 1d, 1f?)

Isis von Oken 1835, H, 1-12

W.C. Brøgger 1882:

"Die silurischen Etagen 2 und 3"

Pl. 3, fig. 17

Universitätsprogram für 2. sem. 1882.

L. Størmer 1940:

"Early description of Norwegian Trilobite"

Pl. 1, fig. 9, Norsk geol. tidsskr. 1940. 20.

C H2690a *Ceratopyge forficula* (Sars) (se *Olenus forficula*)

W.C. Brøgger 1882:

"Die silurischen Etagen 2 und 3"

Pl. 3, fig. 17

Universitätsprogram für 2. sem. 1882.

D H2690a *Ceratopyge forficula* Sars (se *Olenus forficula*)

L. Størmer 1940:

"Early description of Norwegian Trilobites".

Pl. 1, fig. 9

Norsk geol. tidsskr. 1940. 20.

Of late we have recognized the need for a *secondary type collection* to accommodate all those specimens, other than the five types, which an author has mentioned (but not figured) in particular. Such specimens can include those identified from localities other than the type locality and mentioned in a distribution list, a specimen mentioned because of its size or peculiarity, and most important of all, those specimens measured and treated statistically. These can number a few to many tens, even hundreds and in my view are just as important as primary types, for if future palaeontologists are to be able to check another's conclusions and statistics, then they too must be able to examine the original material on which such results were based.

The arrangement and curating of a secondary type collection takes both time and space but nevertheless it does mean that important reference material is kept together and the risk of it becoming lost is less than if it were returned to the general collections. Also included in our secondary type collection are those specimens belonging to postgraduate theses. Much of this will never be published and cannot be defined strictly as 'type', yet it is important reference material which should not be allowed to disappear when the student leaves, or separated and placed in the general collections. University regulations insist that a copy of the thesis should be deposited in a University library and since 1977 we have insisted that a fully curated collection is also expected when the student's work is complete. A course in taxonomic methods and curating is offered to this end and we consider this important in an attempt at encouraging the philosophy of *irreplaceability of specimens* and the value of well-curated collections for future generations. In many cases it costs considerable sums of money to collect the material and on that account alone it would be irresponsible to neglect it.

The centralization of type collections

It is not surprising that because of the size and importance of its collection, the Palaeontological Museum, Oslo, functions in effect as a National Museum for Norway. Colleagues in other natural history museums recognize this as a practical expediency and there is considerable advantage in having as much type material as possible assembled in one place because of ease of access and professional care. This has been recognized by the Norwegian Petroleum Directorate who, after approval from the Museum, has agreed that when available, all type and figured material derived from off-shore drilling samples shall be deposited in Oslo, and this will be one of the conditions under which core samples will be made available for study. As yet we do not know how many fossils are likely to be described, but in over thousands of metres of newly released borehole core there is clearly an enormous potential which would demand not only special curating techniques but also extra staff. Certain special collections such as those from the Polar regions have always been deposited in Oslo and it would be unfortunate if future collections were to be deposited elsewhere. Likewise an agreement has been recently reached between Bergen and Oslo that a newly discovered mammoth tooth should be deposited in Oslo where all hitherto similar Norwegian finds exist. I wish the same could always be said of fossil material collected by foreign geologists working in Norway. In my view the rightful place for primary type material is in a recognized museum in the country of its origin and should be regarded as much a part of that country's national heritage as a work of art or other national treasures. We can, however, at present only rely on the goodwill of

foreign geologists to recognize this and automatically deposit their holotypes and paratypes in Oslo while agreeing to deposit extra material in a recognized institute in their own country. I would not like to see this rule made legal though I am afraid that the time will come in the not too far distant future when it might be necessary.

Centralization of primary type collections within Norway is something which I should like to see, and in principle Tromsø Museum is in favour of this because of lack of facilities there. Colleagues in Bergen inform me that they intend to maintain their type collection and this is to be respected. Nevertheless, in doing this they should be aware of the responsibility a type collection entails, including its safe and recorded existence. Furthermore a type is an object whose scientific value is incalculable and its loss to science a disaster.

Acknowledgements. I thank B. Neuman (University of Bergen), L. Osland (University of Tromsø), H.-J. Lønne (University of Trondheim), and E. Bergsager (Norwegian Petroleum Directorate) for providing information on collections in their care. My colleagues Natascha Heintz, Gunnar Henningsmoen, and Alan Owen have read and criticized the manuscript, the final version of which, however, is my responsibility. I owe special thanks to Anne-K. Punsvik for help with background data and for typing the manuscript.

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DISCUSSION

P. J. Lawrance. Do you store your type specimens on a ground floor or basement, is the room fire-proof in any way, and is it near an exit?

D. L. Bruton. Our present type collection room is not fire-proof but we hope to get one in the early 1980s when the Museum is to be refurbished. I am afraid that in the event of fire, labels would char even though we have the collections in metal cabinets which are to some extent fire-resistant. The room is in the basement but has fairly large windows. I think that if there was a fire near by then given half an hour or so we could get a large part of the collection out through these windows. I really fear fire more than anything else, and even given a fire-proof room or cabinets, I am sure that in an intense heat labels would be damaged.

P. J. Lawrance. Have you thought of replacing your cardboard trays?

D. L. Bruton. We have considered replacing them but so far have not found anything better or something which we can afford. The standard cardboard box which we use is 12 × 9 cm, and costs 9-6p! Can anyone suggest something more suitable?

S. A. Baldwin. Do you as a policy keep photocopies of your labels so that if a fire does break out you have copies, and if so are these copies kept in a different building?

D. L. Bruton. No, but we do have a type collection card index containing the same information as is on the labels. I am afraid, however, that it is in the same building and in the same room as the specimens.

R. B. Rickards. In relation to the fire problem, some years ago we had advice at the Sedgwick Museum on the problem and found that metal cabinets were not so good in protecting specimens as wooden cabinets with $\frac{3}{4}$ inch oak fronts.

D. L. Bruton. We originally had wooden cupboards, some with oak trays, but we changed these in favour of metal cabinets. The latter were cheaper and the standardized metal trays can be moved from cabinet to cabinet without difficulty, and distances between trays can be regulated to accommodate large specimens.

F. M. P. Howie. I notice that you mentioned the problem of unstable specimens and their preservation—do you have many?

D. L. Bruton. We have many unstable specimens including pyritized ones, but the worst are those preserved in Cambro-Ordovician Alum shales. These are a real problem for, as you know, the shales when oxidized and hydrated swell and destroy the specimen and give off sulphuric acid capable of rotting labels and even corroding any iron which happens to be in contact. Our technicians have started experimenting with various techniques for preservation, but I am afraid that as yet it is something we have not seriously considered.

F. M. P. Howie. Is the type specimen room a large room, and is it air-conditioned.

D. L. Bruton. It is approximately 32 sq. m, with large windows on one side facing east. Fifteen metal cabinets, 2 m \times 86 cm \times 52 cm, line three walls and also stand in the centre of the room. The room is centrally heated during the winter months. Given the funds it could be air-conditioned and we have talked about the room and other storage space being air-conditioned in the future.

P. Aspen. Could Dr. Bruton tell us about the loan policy for type material in Paleontologisk Museum in Oslo?

D. L. Bruton. We have a very liberal loan policy which seems to work remarkably well, and all type specimens can be borrowed. However, we have strict conditions of loan which apply especially if the material borrowed is to be described and/or figured. These are:

1. All specimens are to be identified by a number which is to be published with the prefix PMO (Paleontologisk Museum Oslo). We supply ready-typed numbers for the borrower to stick on to previously unnumbered specimens.

2. Prior to publication the borrower must inform us of: (a) title of the paper; (b) the name of the journal and the approximate date of publication; (c) approximate number of pages, figures, or plates dealing specifically with our material; (d) supply the museum with a list of all specimens that will appear in the publication. This includes measured or mentioned specimens which will be kept in the secondary type collection. (This list is required to aid the Museum cataloguer in her work.)

3. When the publication is out we ask for, if possible, three copies to be sent for use in the type collection, the catalogue room, and Museum library, respectively.

B. J. Pyrah. I would like to stress that responsibility for the curation of specimens must rest with researchers as well as curators. It is essential that research workers inform us when they are figuring our specimens, and I believe that they also have a responsibility for the correct labelling and recognition of the status of specimens which they have investigated.

D. L. Bruton. I agree entirely with this view. Labelling the specimen is an integral part of the research. The label contains valuable information and documentation for future generations of scientists and is something that the present researcher owes them.

A. W. A. Rushton. It must be the responsibility of research workers, not editors, to inform curators that specimens from their museums are to be figured, etc. Editors must, if necessary, tell authors of this and not

allow publication of unregistered specimens. Although it is desirable that authors send reprints or copies of their works to curators of those museums from which they figured certain specimens, this may not be feasible if the paper is a monograph with material from scores of museums.

D. L. Bruton. In the event of the borrower being unable to afford to send three copies of the publication, then our Museum would be willing to buy them. In fact we have done this and regard it as money well spent.

M. G. Bassett. We have a similar set of conditions for borrowers in the National Museum of Wales, which is based very closely on that of Oslo. If publication eventually takes place in a large monograph we ask for a photocopy of the title page, with a list of the specimens that the author has used.

B. W. Page. I was particularly interested in the teaching aspects of curation which are employed at Oslo. Is this taught at undergraduate or postgraduate level?

D. L. Bruton. Postgraduate students of palaeontology are taught the basic principles of taxonomy (4 hours) in connection with a broader course entitled 'Evolution—theory and practice'. They also receive a course in chemical and mechanical preparation techniques, serial sectioning, photography, plate making, and preparation of a manuscript and text-figures. Both courses are held at Paleontologisk Museum and are given by the scientific and technical staff.

H. S. Torrens. What sort of survival rate for types do you have in Norway? Do you think there is a possibility of putting a figure on it? For example, how much material do you look for and fail to find?

D. L. Bruton. In the past when type specimens were used for display and teaching, then there were losses. In some cases we have no record as to whether the missing specimens were ever deposited in the Museum. From 1930–1960, however, losses were very few, mainly from some of the larger collections worked on by foreign geologists, while in recent years we have almost a 100% survival rate.