Is the Jongmans collection cultural heritage or a scientific collection?

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Wilhelmus Josephus Jongmans (1878-1957) was a Dutch botanist who became involved in palaeobotany at an early stage in his career. He became head of the department of the geological survey for coal winning in Limburg ('Geologisch Bureau voor het Mijngebied'). He accumulated the bulk of the fossil plant collection now kept in the Nationaal Natuurhistorisch Museum. A great deal of this collection consists of Carboniferous material gathered during the period of coal exploitation in the south of the Netherlands, but it also reflects the research interests of its collectors and keepers and consequently is a reflection of the state of the art in palaeobotany since approximately 1920.
In 1996 the Dutch Geological Survey was reorganized and the palaeobotanical collections needed to be kept safely for future generations. Our museum felt that the collection was both a reflection of Dutch history and a valuable scientific collection. Consequently half a floor of the collection tower was made available for the 70,000 plant fossils composing the collection.

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Introduction

In March 1996 the palaeobotanical collection known as the Jongmans collection was transferred from a branch of the Geological Survey in southern Limburg ('Geologisch Bureau voor het Mijngebied') to the Nationaal Natuurhistorisch Museum in Leiden, The Netherlands. This transfer was the subject of several articles in national and regional newspapers. The history of the collection and its collector are outlined herein to illustrate both its scientific and cultural significance. The composition and the organization of the collection are described to illustrate how it was used for prospecting purposes in the mining industry and how it is still being used for fundamental research.

Life of Wilhelmus Josephus Jongmans (1878-1957)

Wilhelmus Josephus Jongmans was born on August 13th, 1878 in Leiden, The Netherlands. He was a good pupil at school and was clearly predestined to go to the

university. At first his interest was directed to pharmacy, but after two years he decided to become a botanist. For his dissertation he went to Munich, Germany, in order to work under the supervision of Professor K. Goebel. Jongmans defended his thesis in 1907. Before he finished his dissertation he already was asked to take up the function of second curator at the National Herbarium in Leiden, the first being Dr. J.W.C. Goedhart. Together with Goedhart he had started working on plant distribution maps of the Netherlands (Goedhart & Jongmans, 1904-1907) for which they elaborated a system that is still in use in nearly the same form. The maps were published regularly but their publication stopped after 1907, probably because Jongmans left to southern Limburg.

He started to work on the palaeobotany of the coal layers being exploited in Southern Limburg by what would later become a branch of the Geological Survey (Rijks Geologische Dienst, RGD). He developed an interest in plant fossils and was asked by Dr. Ing. W.A.J.M. van Waterschoot van der Gracht, director of the Rijks-Opsporing van Delfstoffen (later to become the Geological Survey, RGD) to describe the fossil content of the coal layers of southern Limburg (Jongmans, 1928) which resulted in a palaeobotanical contribution to a paper on the deeper geology of The Netherlands by van Waterschoot van der Gracht (1909). He got this position because of his botanical background. Indeed, the director believed that a botanist should describe the plant fossils (van Waterschoot van der Gracht, 1932). When new boreholes were drilled, Jongmans was given the possibility to work both at the Rijks Herbarium and at what had become the RGD. In 1910 he was dispensed from his work at the National Herbarium and started working full time in southern Limburg at the RGD. In 1915, Jongmans published his first palaeobotanical paper on the Carboniferous palaeobotany of southern Limburg and his first correlations with German coal layers.

Jongmans took over the project of the German H. Potonié to assemble all literature on the different palaeobotanical taxa in volumes now known as the *Fossilium Catalogus*. Van Amerom and van den Burgh are still working on this series of volumes. This work could only be achieved by knowing all of the literature on these taxa. Over the years Jongmans assembled *c.* 29,600 papers from which 23,800 are now kept at the library of the Nationaal Natuurhistorisch Museum and which Dr. Johan van der Burgh has recently reorganized.

The most important systematical work that was written by Jongmans was a monograph on *Calamites* that he wrote in cooperation with Dr Kidston in Schotland (Kidston & Jongmans, 1917), who can be considered as his mentor (Wagner & van Amerom, 1995). Later he started working with Gothan, who had written a dissertation on palaeobotany and was working in the German Westphalian just across the border from southern Limburg; they published many important papers together (Jongmans & Gothan, 1925, 1934, 1935, 1952). In 1919 Jongmans commenced running the Geological Bureau in Heerlen and in 1924 he became its director; this sounds more than it was as there were only two geologists working there (Thiadens, 1957)!

During the period of exploitation of the mines the palaeobotanical collection grew steadily as each Saturday morning mining engineers would come to the Geological Bureau and would show new material that had been gathered during the week, which would consequently become part of the collection. This led gradually to the accumulation of one of the largest collections of Westphalian plant fossils at that time associated

with very good lithostratigraphic data. This collection formed the base for several monographs (Boersma, 1972, van Amerom, 1975), but much revision remains to be done (Wagner & van Amerom, 1995).

Throughout his career Jongmans pattern of publication changed from writing monographs on genera to describing complete floral assemblages. He made many trips abroad such as to the United States of America when he discovered the resemblance between the floras on each side of the ocean. He sampled in Turkey, in Spain, in East Block countries, the Donets Basin and even in China. He considered the Carboniferous of The Netherlands to represent a temperate zone and looked for the tropical areas in northern Africa. Other assemblages he described were the Jambi flora from Sumatra (Jongmans & Gothan, 1935), for which he organized the expedition, and the palaeoflora from Irian Jaya.

One of the most important achievements of Jongmans is that he managed to develop a general stratigraphic framework for north Western Europe by organizing several congresses for all scientists from the various coal districts. The first "Congrès pour l'Avancement des Études du Carbonifère" was held in Heerlen in 1927 and was a great success (Jongmans, 1928). This first congress was a gathering of two dozens stratigraphers but has led to what today is the International Congress of Carboniferous and Permian Stratigraphy welcoming more than 500 professionals.

Later in his life Jongmans became Professor of Palaeobotany at the University of Groningen, which was a long trip from southern Limburg where he lived (Wagner & van Amerom, 1995). All these activities have led to an impressive list of some 250 publications on a great variety of subjects, such as literature review (*Fossilium catalogus*), taxonomy, stratigraphy, petrography, palynology, palaeogeography, museology, nature protection and even seismology as the exploitation of the mines at the time led to soil instability. Most impressive was the large collection of plant fossils that he left to us, reflecting his taxonomic, stratigraphic and palaeogeographical research interests. Jongmans died in 1957, before the mines in southern Limburg closed, whilst still being very active and leaving much work unfinished. Fortunately, his coworkers finished much of this work later (Fig. 1).

Fig 1. Wilhelmus Josephus Jongmans (1878-1957) in 1957.

Collection composition

The Jongmans fossil plant collection holds *c.* 70,000 palaeobotanical fossils. They are distributed over some 6150 boxes. Each box holds on average 11 samples. This number was established by calculating the mean number of samples in each of 40 randomly chosen boxes in the collection (making sure each collection type was well represented).

The collection is composed of several subcollections, the systematic, representing about half of the collection, the stratigraphic, representing about a quarter to a third, some private donations and the cores, each representing one eighths of the total.

1. The taxonomic collection is mainly composed of samples from the mines, organized according to their genus. This is the main part of the collection and is composed of 2775 boxes: 870 seed ferns, 677 horsetails, 532 club mosses, 506 regular ferns, 51 boxes conifers (*Cordaites*), 88 flowering plants and 51 with divers taxonomy groups like e.g., the Psilophytales and the Cycadales (Fig. 2).
2. The stratigraphic collection is composed of 1464 boxes consists of samples organized according to their age and geographical provenance. Most of this collection is Carboniferous, constituting 60% of this part of the collection. Twelve percent is Tertiary, 7% Permian, 6% Devonian (a.o. Bear Island), and 5% Quaternary. Very little material is from the Triassic (4%), Cretaceous (3%) and Jurassic (2%). Specimens are mostly from Europe, with some material from Eastern Europe (Czechoslovakia, Russia). Other regions represented are Africa (Egypt, Morocco, Algeria and Rhodesia), America, the Middle East (Turkey, Iran) and the Far East: Indonesia, Irian Jaya, China. Most plant fossils are from The Netherlands; these samples are organized according to the mine in which they were found. A card system that came with the collection indicates the depth at which they were found, and what fossils were identified in that particular rock sample. Many plant fossils also come from Spain (Valdinfierno, La Camocha and other localities), and there is a significant number of specimens from Austria (Stangalpe). Other European provenances are Belgium France, Germany, Italy, and Sweden, but surprisingly little material from the United Kingdom (Fig. 3).
3. The cores are kept in *c.* 830 boxes. These were not only taken during the lifetime of Jongmans but also after his demice by the Geological Survey of The Netherlands.
4. The remaining collections represent *c*. 570 boxes. These are smaller collections donated to the Geological Museum in Heerlen, including a mineral collection of Professor Molengraaff.

Collection use

The Jongmans collection, due to its size, was only partly worked on in the past 50 years or more, and consequently much identifications need to be reviewed and compared to modern literature. Moreover, new methods need to be applied to the collection, like cuticular research, which has added much information to macroscopic determinations or the use of *in situ* spores determinations. Other approaches like taphonomic analysis can shed new light on the collection (Jones & Rowe, 1999).

At the end of the Carboniferous new Permian floras replaced the older ones. This fundamental pattern and its climatic and palaeogeographical constraints are still not fully understood and are the object of international research. The Jongmans collection holds several subcollections that reflect these changes, but they haven't been studied in this framework yet. For example the Permian Jambi material from Sumatra and the Stephanian material from the Stangalpe in Austria are relevant to those studies.

The Jongmans collection includes a large collection of fossil plants from the Upper Carboniferous (Pennsylvanian) that is of interest for taxonomic studies. A number of

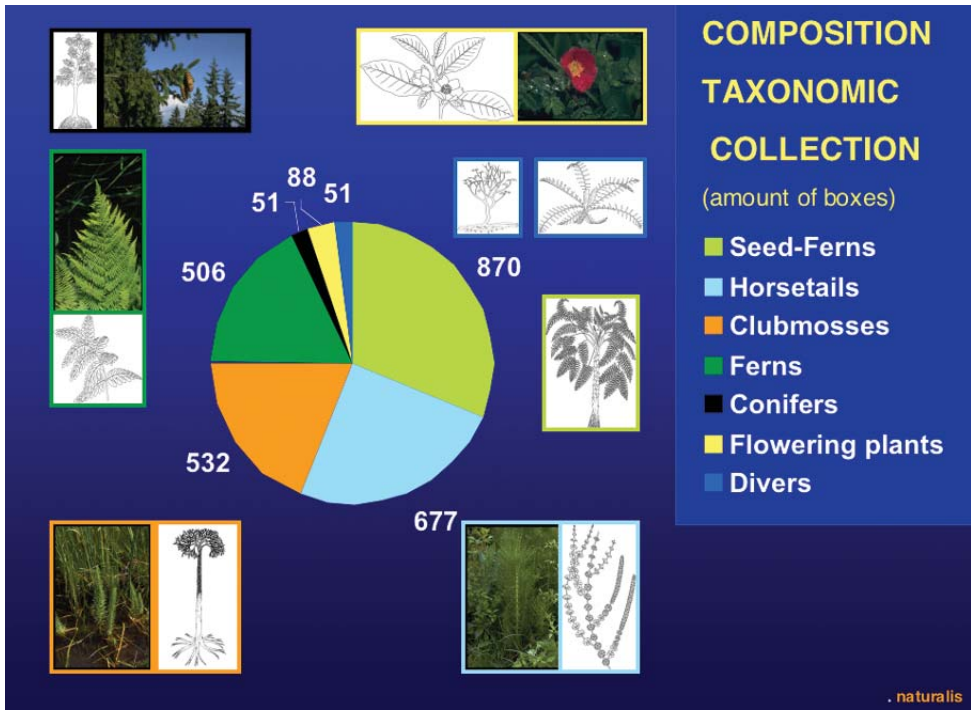

Fig. 2. Affinity of the 2765 boxes from the taxonomic collection, mostly seed ferns.

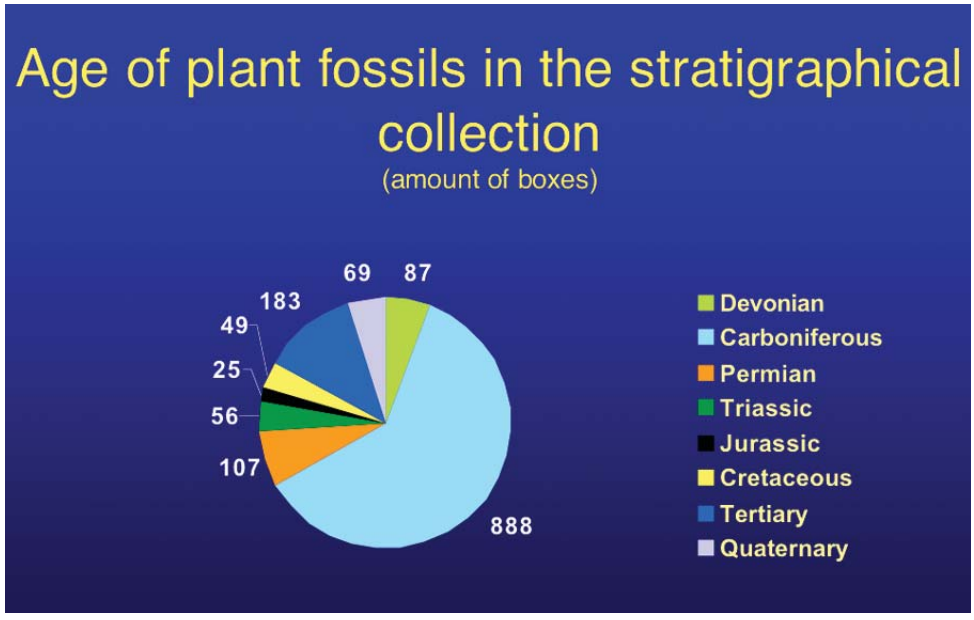

Fig. 3. Geological age of the *c.* 1970 boxes from the stratigraphic collection, mostly Dutch Carboniferous.

genera have in the past been subject to taxonomic revisions (Wagner, 1968; Boersma, 1972). The morphogenus *Sphenopteris* includes material belonging to the seed ferns that has been revised under the name *Eusphenopteris* (van Amerom, 1975), but the botanical affinity of a number of Sphenopterids remains unknown. Several of these species are moderately to highly dissected, and have also been attributed to the genera *Palmatopteris* and *Diplotmema*. The delimitation of these genera still needs to be clarified. Many more genera still need to be reviewed in a similar way.

The macrofossil record of the type area of the Maastrichtian (Upper Cretaceous), south Limburg, The Netherlands, is currently under study. Macroremains of conifer leaves and shoots have been assigned to eight different taxa, and the study of angiosperm leaf remains has just begun. Additionally, there are a number of (mainly silicified) wood remains that still have to be examined. In the past, mainly angiosperm wood remains from the Cretaceous of Limburg have been described, but the conifer wood has never been studied in detail. The conifer families from the Maastrichtian of southern Limburg need to be described and compared with the fossil leaf and pollen record.

The Jongmans collection also holds exhibit material from the Westphalian of the southern Limburg. As a matter of fact it is a very good source of specimens to communicate the history of plant life to the public, both in the Nationaal Natuurhistorisch Museum as in Geon, the regional museum of southern Limburg where the Mining Industry and it products have become part of the cultural heritage and where nostalgia can be illustrated by paraphrasing the title of book by Llewellyn (1939) "How black was my valley!".

In spite of the intensity of these regrets that have manifested themselves in both national and local news papers, the Jongmans collection is, before anything else, a scientific collection of national dimensions and deserves to be kept in a national museum.

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