

## Maria Lejeune-Carpentier (1910–1995): a memorial

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**Abstract** – Maria Lejeune was by training a zoologist, working on living and fossil hexacorals. However, over a period of 16 years, she devoted her research attention to the microfossils contained in flakes of Upper Cretaceous flints, some from C. G. Ehrenberg's classic collection, others from Belgium and the Baltic region. The results were published in 16 short papers, remarkable for the detail and precision of her descriptions and drawings. In addition, she made the first—and, so far, finest—large-scale models of fossil dinoflagellates. These were lodged in the Museum of the University of Liège, where she served as curator for 33 years (1942–1975). Eighteen years after her own micropalaeontological studies had ended, she aided W. A. S. Sarjeant in an extended restudy of her type material, reported in two joint papers. *J. Micropalaeontol.* 18(2): 137–142, December 1999

When Christian Gottfried Ehrenberg discovered, around 1835, that microfossils could be observed in thin, transparent to translucent flakes of Upper Cretaceous flints, he stimulated a brief burst of interest among English microscopists. However, by the time of his own last publication (1855), interest had ebbed throughout Europe. It was not until the 1920s that this study was again taken up, successively by Walter and Otto Wetzel in Germany and by Georges Deflandre and his students in France. Deflandre's researches, in particular, were of high quality, but they were surpassed in precision by the observations of his Belgian contemporary, Maria Lejeune. Indeed, her drawings—made with microscopes of a quality that would not be considered acceptable by present day palynologists—were remarkable for their accuracy.

Maria Lejeune was born in Verviers, Belgium, on 17 October 1910. She was an excellent student, gaining a provincial bursary for her work in Greek and Latin. She proceeded to undertake university studies with the support of a 'scholarly work' bursary from the town of Verviers and a provincial award of funds. She worked for a while as a schoolteacher, teaching children between the ages of 6 and 12, before proceeding to take her master's degree [*licence*] in zoology. Her researches concentrated on living and fossil hexacorals (scleractinids); she gained her doctorate in July 1933. The results of this work were published in two papers (1933, 1935).

During the next five years, Maria worked as an assistant in the Laboratory of Palaeontology of the University of Liège. She was able also to supplement her knowledge by examining specimens in the Musée Royal d'Histoire Naturelle in Brussels, the museums of Paris and the Museum für Naturkunde, Berlin, also making shorter visits to museums in Munich and Frankfurt-am-Main. Her researches and travels were supported by six awards from the Belgian Fonds National de la Recherche Scientifique. She participated in the Exposition Internationale de l'Eau, Liège, in 1939; her exhibit gained a silver medal.

After completing her doctorate, Maria decided to shift research focus. She had become intrigued by the problem of the origin and geological significance of the flint nodules that were to be found in such abundance in the Upper Cretaceous chalk of northwestern Europe. In a short paper (1936a), she discussed the relevance of microfossils to the resolution of these

problems. This was to be the first in a long series devoted to 'L'étude microscopique des silex', all of them published in the *Bulletins* appended to the *Annales* of the Société Géologique de Belgique. Only two research reports were published in other journals—a brief account of techniques, included in the *Comptes-rendus des Séances* of the French Academy of Science (1936b) and a careful restudy of the type material of Ehrenberg's species *Peridinium* (now *Palaeoperidinium*) *pyrophorum*, contributed to the *Bulletin* of the Musée Royal d'Histoire Naturelle de Belgique (1938b).

The initiation of the morphological and taxonomic studies, in which she was to display such precision in text and interpretative drawings, came when she examined anew the type specimen of Ehrenberg's species *ramosum*. This species had initially been placed into the desmid genus *Xanthidium*; Maria was unaware of Gideon Mantell's transfer of it to his genus *Spiniferites* (1846) and, in consequence, accepted Otto Wetzel's (1933) placement of it as type species of his genus *Hystrichosphaera*, the central taxon in his Order Hystrichosphaeridia—popularly, the 'hystrichospheres'. Maria compared Ehrenberg's holotype, which she re-illustrated, with a series of specimens she had discovered in flints from Limbourg, Belgium (1937a).

In her next paper (1937b), also published in the *Bulletin* of the Société Géologique de Belgique, but not numbered as a part of her series, she reviewed (rather superficially) Ehrenberg's work on fossil peridinians in flints. After that (1937c), she resumed her studies of the variation exhibited by specimens which she considered attributable to *Hystrichosphaera ramosa*. (Her illustrations of double-walled forms can now be seen to include representatives of at least two other genera, *Hystrichostrogylon* and *Avellodinium*.) In common with her contemporaries, Maria did not perceive the significance of the openings in the 'hystrichospheres'; it was not until 13 years later that the work of William R. Evitt (1961) transformed our understanding of these microfossils, using the openings as evidence that the 'hystrichospheres' were dinoflagellate cysts. Concerning the significance of thin filaments associated with some of the microfossils—filaments that might represent a flagellum—Maria was properly tentative; indeed, subsequent work has not supported that interpretation.

Shortly after the publication of that paper, Maria married.

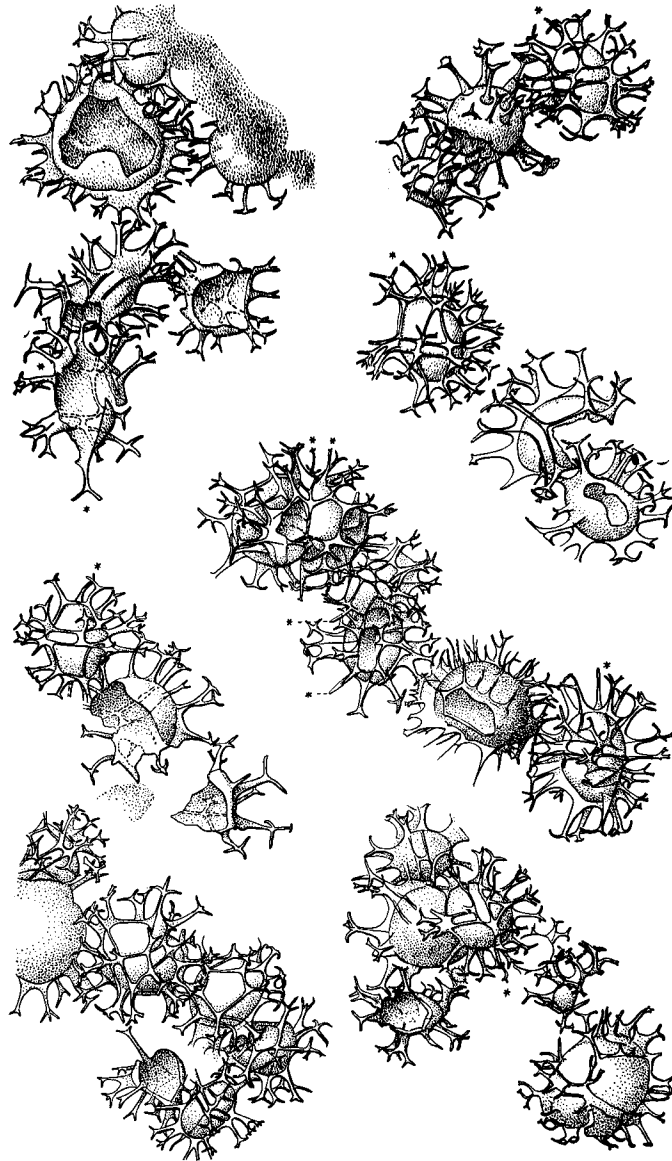


Fig. 1. Lejeune-Carpentier's illustrations of 'trails of hystrichospheres in a flint from the Ehrenberg collection' (4 November 1937).

Her husband, Fritz Carpentier, was older than Maria; he had been born on 17 March 1890. He was an anatomist and entomologist, specializing in the dissection of the thorax of insects and publishing numerous papers on this theme. He presented courses on invertebrate morphology at the Université de Liège and served as conservator of its zoological collections, assembling a very important and well-organized collection of insects that illustrated the characteristics not only of different families, but also of the different species within those families. This collection was subsequently presented to the Institut Royal des Sciences Naturelles, Brussels.

Her marriage was to have a major influence on Maria, for her husband was a man of strong personality. Henceforward, her papers were published under her married name, as 'Lejeune-

Carpentier'. Though palaeontology never became important to her husband, they did publish a joint study of the anatomy of an Upper Carboniferous (Stephanian) dragonfly (1949). Their daughter, Anne-Jacqueline Carpentier, was born on 1 October 1940. Twenty-seven years later a son, Frédéric—born on 28 April 1967—was adopted.

For a while, Maria continued her re-study of Ehrenberg's slides. Her next paper (1938b)—the first to appear under her married name—described a preparation by Ehrenberg in which 'hystrichospheres' were especially concentrated, sometimes forming chains (Fig. 1). Several of her drawings clearly show the cyst openings that were to prove so crucial to Evitt's reinterpretation and, indeed, Maria noted these, terming them *déchirures* (rents or tears). Her next paper (1938c) extended these



Fig. 2. Maria Lejeune-Carpentier at her microscope in the Museum of Zoology, Liège (1969).

detailed studies of morphological variation, treating with lateral excrescences from hystrichosphere walls; these features were to be used by other palynologists to characterize distinct genera (*Hystrichostrogylon* and *Stephodinium*).

Following her redescription of Ehrenberg's species *Peridinium pyrophorum* (1938b), Maria at last began describing new taxa. First came her erection of the genus *Areoligera*, based on the new species *A. senonensis* from Belgium (1939a). Three species described earlier by Otto Wetzel (1933)—*A. coronata*, *A. medusettiformis* and *A. tenuicapillata*—were transferred to this genus. Then came her description of a new peridinium, *Gonyaulax wetzeli* (1939b); and, after that, a review of the group of hystrichospheres with tubular processes (1940), in the course of which she described two new species, *Hystrichosphaeridium major* and *H. elegantulum*.

Possibly as a consequence of her experience as a school-teacher, Maria had a very strong desire to present her information in a fashion readily comprehensible by persons unacquainted with her discipline. To facilitate the understanding of dinoflagellates and 'hystrichospheres'—fossils too small to be displayed—Maria made large-scale models of them, utilizing impregnated (sized) paper for this purpose. The models were presented at an exhibition in Liège in 1939; they are still of an

unparalleled quality and may be seen in the Museum of Palaeontology in Liège (see Plate 1).

By the time her eighth 'Note' appeared (1940), the Second World War had broken out and Belgium had been invaded by the Germans. Despite wartime problems, publication of Maria's studies of flint microfossils continued. However, she could no longer secure research funding; instead, she became briefly an instructor in a teachers' training college and then, from October 1942, took up an appointment as curator of the Museum of Palaeontology of the University of Liège, a position she was to hold for over 30 years (until November 1975).

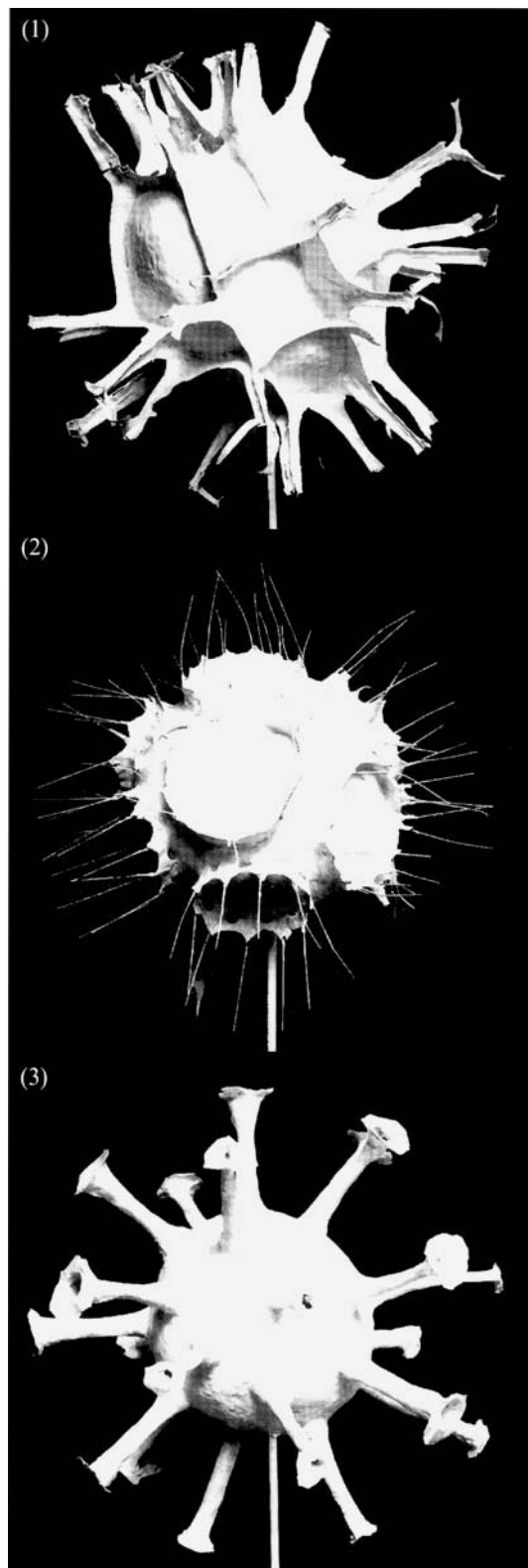
In her next paper (1941), Maria transferred her attention to the 'hystrichospheres' having spine-like processes, closed distally. She undertook careful redescriptions of species which had been first described in England around 1840; these became *Hystrichosphaeridium spinosum* (White) and *H. crassipes* (Reade), both being compared with Ehrenberg's (1854) species, now *H. hirsutum*. The only new taxon proposed was a variety, *H. spinosum* var. *deflandrei*.

Three new dinoflagellate species were described in 1942 and attributed to the genus *Peridinium*—*P. damasii*, *P. galeatum* and *P. subconicoides*—while a fourth, Otto Wetzel's '*Peridinium tricuspis*', was redescribed. (The first two are now perceived to be cavate cysts and have been reattributed to the genus *Deflandrea*; the third is now placed into *Palaeoperidinium* and Wetzel's species into *Phelodinium*.) Her next paper (1944) was essentially taxonomic. Maria examined a tiny form that Deflandre had placed into his genus *Micrhystridium*, even though it had crests rather than spines; she was sure it was a dinoflagellate and transferred it to the living genus *Ceratocorys*.

In her penultimate personal contribution to micropalaeontology (1946), Maria considered existing and new species with tabulations similar to that of the living *Gonyaulax*. Her own species, *G. wetzeli*, was re-examined; a form mis-attributed to an existing species by Wetzel was elevated to specific status, as *G. obscura*; and a single specimen with a porous wall became *G. porosa*. The last in her series of studies of flint microfossils did not appear until five years later (1951); it examined some very small dinoflagellates, some assigned to the living genus *Gymnodinium* and some to Deflandre's (very poorly defined) genus *Phanerodinium*. Two new species, *G. avellana* and *P. fourmarieri*, and a new variety, *P. cayeuxi* Deflandre var. *laeve*, were proposed, all from Belgian flints.

A principal concern of Maria, throughout her time at the Museum (Fig. 2), was the education of students. She was a patient supervisor of the practical work undertaken by students taking the course in vertebrate palaeontology for their masters' degree in geology and by engineering and mining geology students engaged in zoological studies. All those students warmly remember her kindness and patience.

In April 1969, the first author had the pleasure of meeting Maria during a visit with colleagues to her laboratory in Liège. She proved a delightful person, gentle, courteous and good-humoured. Maria was kind enough to show them some of her type specimens, admirably curated for ready accessibility, and her splendid models of dinoflagellates (Plate 1). However, in a period of changing interpretations and improving microscope facilities, it was clear to him that her type material required re-description. Ten years were to pass before this proved possible.



#### Explanation of Plate 1

Models of dinoflagellate cysts made by Maria Lejeune-Carpentier. **fig. 1.** *Hystrichosphaera* (now *Spiniferites*). **fig. 2.** *Areoligera*. **fig. 3.** *Hystrichosphaeridium*. Photographs are c. 40% life-size.

In the meantime, Maria retired on pension from the Museum to assist and take care of her husband. He had himself retired several years earlier, but remained active in the realms of zoology and entomology. His deteriorating physical condition meant that he required blood transfusions every three months. Maria helped him in the preparation of a few publications, in dealing with a voluminous correspondence and in carrying out other scientific duties that were required of him.

Fritz Carpentier died on 17 September 1978. Following his death, Maria prepared a comprehensive listing of his personal collection of insects, prior to presenting them to the Musée Royal des Sciences in Brussels. She was to undertake further work, in association with one of her husband's former collaborators, for the royal circle of entomology, furnishing details of Fritz's earlier researches and providing access to his private library.

At about this time, the first author was at last able to visit Liège and work with Maria. Dr Maurice StreeL and the second author very courteously furnished their aid and their microscopes to enable a joint re-study of Maria's slides. (She was still attached to the Laboratoire de Paléontologie Animale as 'Honorary Observer').

She found this return to microscope work exciting. While working with the first author, she told him: 'This makes me feel young again!' and chatted away happily to him in French at a pace often beyond his limited linguistic comprehension! She was always quickly able to locate her specimens in the flints, after he had searched long for them in vain. On his last night in Liège, she insisted in treating him to dinner and, when the first of the two reports of their joint work was published, she appended at proof stage a most complimentary footnote, of which he was not aware till the published copies reached him. All in all, it was a very happy collaboration.

Their first joint paper (1981) reviewed the larger dinoflagellate cysts preserved in her flints. With much better microscopic equipment, much more detailed drawings could be made and better photographs taken, yet Maria's earlier observations were in general supplemented, rather than corrected—a great tribute to the accuracy of her work. Many of her species had already been re-assigned to different genera by other authors: emended diagnoses were proposed for seven of these—*Gonyaulacysta wetzeli* and *G. obscura*, *Leptodinium porosum*, *Deflandrea damasii* and *D. galeata*, and *Palaeoperidinium? subconicoides*. Three were reassigned, Reade's species *crassipes* tentatively to *Hystrichokolpoma* and Maria's species *major* to *Amphorosphaeridium*, while Wetzel's species *cruciata* was now considered an acritarch and transferred to the genus *Veryhachium*. The morphotype earlier considered attributable to *Hystrichosphaeridium spinosum*, as var. *deflandrei*, was elevated to specific status as *Fibrocysta? deflandrei*. In contrast, Maria's species *elegantulum* was now rejected as a junior taxonomic synonym of *Oligosphaeridium* (ex: *Xanthidium*) complex (White).

The second joint paper (1983) dealt with the smaller dinoflagellate cysts. In this case, the better equipment caused more extensive re-interpretations of morphology. Deflandre's species *veligera* was now recognized to represent a distinct genus, named *Rhiptocorys*. The new combination *Druggidium fourmarieri* was proposed and Maria's variety *laeve* elevated to specific status within that genus. An emended diagnosis was

proposed for the species *avellana*, by then reattributed to *Dinogymnium*, while the systematic position of other forms Maria had placed into *Phanerodinium*—and, indeed, the utility of that genus—was questioned. Even so, her work had in general stood up well to re-analysis after nearly 20 years.

This was by no means the end of Maria's scientific contributions. Around 1994, she inaugurated and delivered a series of educational presentations to secondary students; these had the aim of explaining the origin of humans and their evolution. They were given with undiminished enthusiasm, for she delighted in making her own knowledge available to such an audience.

After that, however, Maria's scientific activities diminished, instead taking a well-earned rest and enjoying seeing her children grow up. Nevertheless, she continued to collect and to read scientific papers relating to her specialty.

Maria Lejeune-Carpentier died at her son's home at Polleur, near Liège, on 14 March 1995. Though, in the years after her own original researches had ended, good work was to be done on organic-walled microfossils in flint chips by such other people as Lionel Valensi and Jean-Claude Foucher, her work surely represented the apogee of this approach. The genus *Lejeunia* Gerlach, 1961, named after her, was later shown to be a junior homonym, but the substitute name *Lejeunecysta* Artzner and Dörhöfer, 1978 commemorates her instead. Despite her scientific attainments, Maria's death passed unnoticed, either in the newspapers or the scientific journals of her country. This memorial attempts to compensate for that unwarranted neglect of the work of a great microscopist.

#### Acknowledgements

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