

PHYLLOCRINUS FURCILLATUS SP. NOV., A
CYRTOCRINOID FROM THE UPPER JURASSIC
OF KAWHIA, NEW ZEALAND

by I. G. SPEDEN

ABSTRACT. *Phyllocrinus furcillatus* sp. nov. is described from Kuritunu Stream, Kawhia, and is attributed to the Middle Kimeridgian. It is the first record of *Phyllocrinus* outside Europe.

IN 1957 Mr. W. Sutherland, of Kawhia, presented to the New Zealand Geological Survey several blocks of fossiliferous silty mudstone collected from the bed of Kuritunu Stream, Kawhia, some eighty-five miles south of Auckland. An abundant invertebrate faunule, including lamellibranchs, belemnites, fragmentary ammonites, and the crinoid here described, was obtained from the blocks.

The only known occurrence is at Kuritunu Stream, Awaroa Valley, North Island of New Zealand, collection GS 6933, map reference NZMS1, Sheet N.73, grid reference 465970.

Included in the siltstone blocks are fragments of Ataxioceratid ammonites and abundant *Belemnopsis* cf. *aucklandica* (Hochstetter). In the Jurassic sequence on the south side of Kawhia Harbour, identical ammonites and belemnites to those in the blocks are known (Dr. C. A. Fleming, pers. comm.) to occur between the Lower Kimeridgian at Totara Point (Arkell 1956, p. 455) and beds containing Lower Tithonian ammonites and belemnites identical to those at Puti Point on the north side of the harbour (Arkell 1956, p. 454). Thus the assemblage in the blocks is apparently Middle Kimeridgian in age.

World distribution of Phyllocrinus. The genus ranges from Bajocian to Lower Neocomian (see Moore 1948, p. 51, fig. 17, for a generalized diagram) and prior to its discovery in New Zealand was restricted to Europe where it is found in southern France, Jura Mountains, Switzerland, Lombardy, Apennines, Sicily, Austria, and at Stramberg in the north-west Carpathians. Previously, the most eastern locality with *Phyllocrinus* was Theodosia, on the south side of the Crimean Peninsula, where the Tithonian species *P. verrucosus* Retowski (1893, p. 288) is found. Selected localities have been plotted on a map (text-fig. 1).

The record of *Phyllocrinus* in New Zealand, almost antipodal to southern France where it is so well represented in Bajocian to Neocomian sequences, greatly extends its known distribution. It also fulfils the prediction made by Fell (1952, p. 146) when he wrote 'it now begins to look as if we may expect to find other parallels between the Mesozoic Echinoderms of Europe and New Zealand, despite the present lack of corresponding fossil records from intervening points on the globe'.

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SYSTEMATICS

Numbers with the prefix EC refer to specimens catalogued in the New Zealand Geological Survey's register of fossil echinoderms, while the prefix GS refers to an index of New Zealand macro-fossil collections held at the N.Z. Geological Survey. The classification followed is that elaborated for the Articulata by Sieverts-Doreck in Piveteau (1953).

Order CYRTOCRINIDA Sieverts-Doreck 1953

Family PHYLLOCRINIDAE Jaekel 1907

Genus PHYLLOCRINUS d'Orbigny 1850

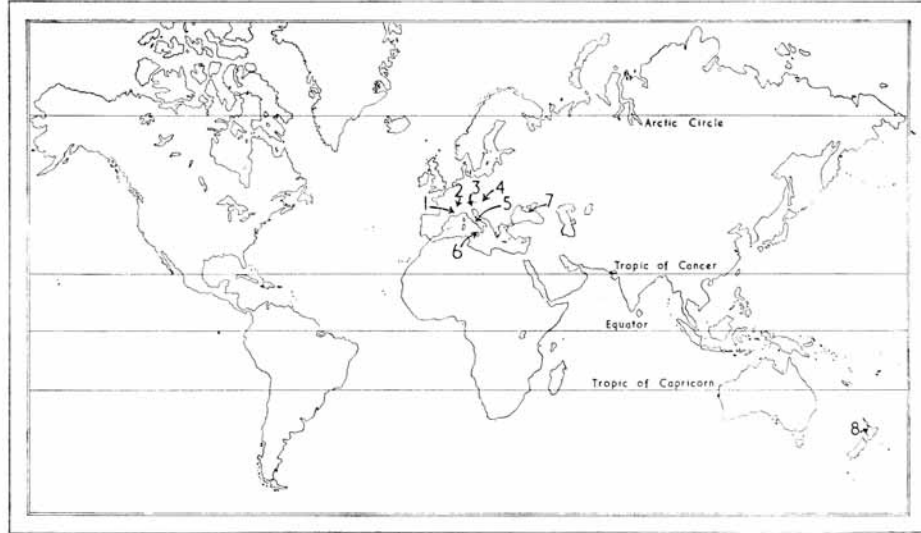
Type species by monotypy: *Phyllocrinus malbosianus* d'Orbigny 1850. Lower Neocomian, southern France.

Discussion. Several different dates have been quoted for d'Orbigny's description of the genus. Zittel (1870, p. 158) gives the year 1851, Bather (1900, p. 197) 1849, and Sieverts-Doreck (1953, p. 756) 1852. Here, the name is attributed to d'Orbigny 1850, the date adopted by de Loriol (1882, p. 160), Sherborn (1928, p. 4931), and Neave (1940, vol. 3, p. 741). The date following the generic name in the *Prodrome de Paléontologie* is 1847, but as explained by d'Orbigny (p. lix) in the introduction to volume one, the date of publication was delayed so that volume two was published in 1850 and not 1847.

By using the words 'C'est un *Pentremites*' in his original description, d'Orbigny clearly thought *Phyllocrinus* was a blastoid. Zittel (1870, pp. 158-64) was first to place the genus in its correct systematic position. He considered that the range of the genus, Upper Jurassic to Lower Cretaceous, indicated it was not rightly placed in the exclusively Palaeozoic Blastoidea, and by a detailed study of specimens of *P. hoheneggeri* Zittel 1870, from the Neocomian of Stramberg, which he compared with the crinoid genus *Eugeniocrinus* Miller, he showed that *Phyllocrinus* is a crinoid. Zittel placed it in the family Eugeniocrinidae and also gave a detailed generic description (p. 162). In 1907 Jaekel (pp. 303-4) established the family Phyllocrinidae in which he included *Phyllocrinus* and his new genus *Apsidocrinus*.

As d'Orbigny included only one species, *P. malbosianus* d'Orbigny in his genus, under Article 30 of the International Rules of Zoological Nomenclature, the genus should be monotypical. However, the rarity of reference to *P. malbosianus* by subsequent authors and, except for Jaekel's (1907, p. 304) brief statement 'Als typische Arten seien genannt der Typus der Gattung d'Orbigny's *P. granulatus* (Fig. 26) und *P. hoheneggeri* Zitt. aus der untersten Kreide,' the lack of mention of a type species by later workers raised doubts in this author's mind as to the validity of d'Orbigny's species. The doubts were increased by Jaekel's (1891) emphasis of the apparent gradation of forms between *Phyllocrinus* and *Eugeniocrinus* and his revision of the placing within these two genera of species described by earlier workers. Through the courtesy of Mme Freneix, Laboratoire de Paléontologie, Paris, M. Roman kindly forwarded a plaster replica of one of d'Orbigny's syntypes (No. 5557a) and M. Roger (S.I.G.) sent a photostat copy of Pictet's

(1867, p. 119) redescription of *P. malbosianus*. The replica and text clearly showed *P. malbosianus* to be a valid species and to be correctly interpreted; it is type of the genus by monotypy.



TEXT-FIG. 1. Map showing the distribution of the genus *Phyllocrinus* in Jurassic to Lower Neocomian times. Within the European area the distribution is illustrated by selected localities.

1, Southern France. *P. gauthieri* de Loriol 1882, Bathonian, Bouches-du-Rhône. *P. alpinus* (d'Orbigny 1850), Oxfordian, Chaudon, Basses-Alpes. *P. malbosianus* d'Orbigny 1850, Lower Neocomian, Barrême, Basses-Alpes. 2, Switzerland. *P. sabaudianus* Pictet and de Loriol 1858, Lower Neocomian, Fribourg. 3, Austria. *P. hoheneggeri* Zittel 1870, Jurassic, Dachstein. 4, Czechoslovakia. *P. hoheneggeri*, Tithonian, Stramberg. 5, Italy. *P. nutantiformis* (Schauroth 1865), Tithonian, Monte Catriano (Apennines). 6, Sicily. *P. checcchiai* Serra 1934, Neocomian, Boschitello, Licodia Eubea. 7, Russia. *P. verrucosus* Retowski 1893, Tithonian, Theodosia, Crimean Peninsula. 8, New Zealand. *P. furcillatus* sp. nov., Middle Kimeridgian, Kawhia.

Phyllocrinus furcillatus sp. nov.

Plate 20

Holotype. EC 196, N.Z. Geological Survey, Lower Hutt. A complete dorsal cup with one interradial extension slightly displaced by a small fracture.

Material. Holotype, eight paratypes (EC 197–204) and six other specimens.

Diagnosis. Each radial plate with a central, narrow, steep-sided, round-topped ridge which bifurcates about one-third the height of the dorsal cup; branches of ridge continue along ventral prolongations of radial plate. Below level of articulatory facets and between branches of ridge, surface of radial plate concave to flat.

Description. Dorsal cup small, approximately pentagonal in transverse section (figs. 1, 3), composed of five radial plates. Each plate has two ventral prolongations (figs. 2, 4) from the outer margins. Radial plates and prolongations strongly fused to form a cup with five interradial extensions (figs. 1, 2, 4).

Interradial extensions slightly incurved over body cavity (figs. 1, 2). Ventrally extensions triangular in cross-section (fig. 9) with the most acute angle pointing towards body cavity. Internally and just above the level of articular facets, the inner edge of extension is grooved by form of body cavity (figs. 5, 7). Side of interradial extensions bordering the socket between extensions straight for dorsal third, but concave for ventral two-thirds, thus forming a prominent angulation at about one-third of their height above the base of socket (figs. 2, 4). Surface of dorsal cup between characteristic ridges deeply depressed (figs. 2, 3, 4), the depression continuing ventrally along the interradial extension as a shallow, narrow groove (figs. 1, 2, 4). Line of fusion of radial plates distinct (figs. 1, 3, 4, 9), situated at centre of depression and groove. Base of socket narrow, constricted medially by interradial extensions; outer part sloping slightly dorsally, inner sloping into body cavity. Articular facets not well preserved, situated at base of socket and on external portion. Each facet with four fossae; a central canal between an external, elongated ligament pit and two internal, kidney-shaped fossae (fig. 6).

Depth of body cavity about half height of dorsal cup (exclusive of extensions) (figs. 8, 10). Base of cup with a deep conical excavation, its depth approximately one-third height of cup (exclusive of extensions) (figs. 8, 10), for attachment of stem.

Arms and pelma unknown.

Dimensions

	H		HC		LE		D		LBC		LSD	
	mm.	%	mm.	%	mm.	%	mm.	%	mm.	%	mm.	%
EC 196*	5.2	2.6	50	2.6	50	5.0	95	..	0	..	..
EC 197	11.8	5.4	45	6.4	55	9.2	80	..	..	..	..
EC 198	4.9	2.4	50	2.5	50	4.9	100	..	..	..	..
EC 199	7.3	3.5	45	3.9	55	6.4	90	..	..	..	..
EC 202	5.5	2.4	45	3.1	55	..	..	1.4	60	0.6	25
EC 203	7.0	3.4	50	3.6	50	..	..	1.7	50	1.1	30

H = height of dorsal cup including interradial extensions; HC = height of body of dorsal cup to level of articular facets; LE = length of interradial extensions; D = maximum diameter of dorsal cup; LBC = length of body cavity; LSD = length of stem attachment depression.

* Holotype

Remarks. Of the twenty-two species of *Phyllocrinus* that have been traced, nineteen are represented by figures or descriptions in literature available in New Zealand and Australia. In nearly all species the surface of the plates forming the dorsal cup is rounded and lacks the prominent steep-sided central ridge present on the plates of *P. furcillatus*. The only species known to the author with a comparable ridge on each radial plate is *P. sabaudianus* Pictet and de Loriol 1858 (de Loriol 1879, pp. 240-1, pl. 19, figs. 31-32).

from the Neocomian of Hivernages, France. However, this species is readily distinguished from *P. furcillatus* as its ridges are not steep-sided and do not branch, but extend ventrally to the level of the articular facets. In addition, the interradial extensions of *P. sabaudianus* curve outwards, thus differing markedly from the slightly incurved extensions of *P. furcillatus*.

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EXPLANATION OF PLATE 20

All figures except fig. 6, $\times 6$; 6, $\times 12$. Small figures show natural size.

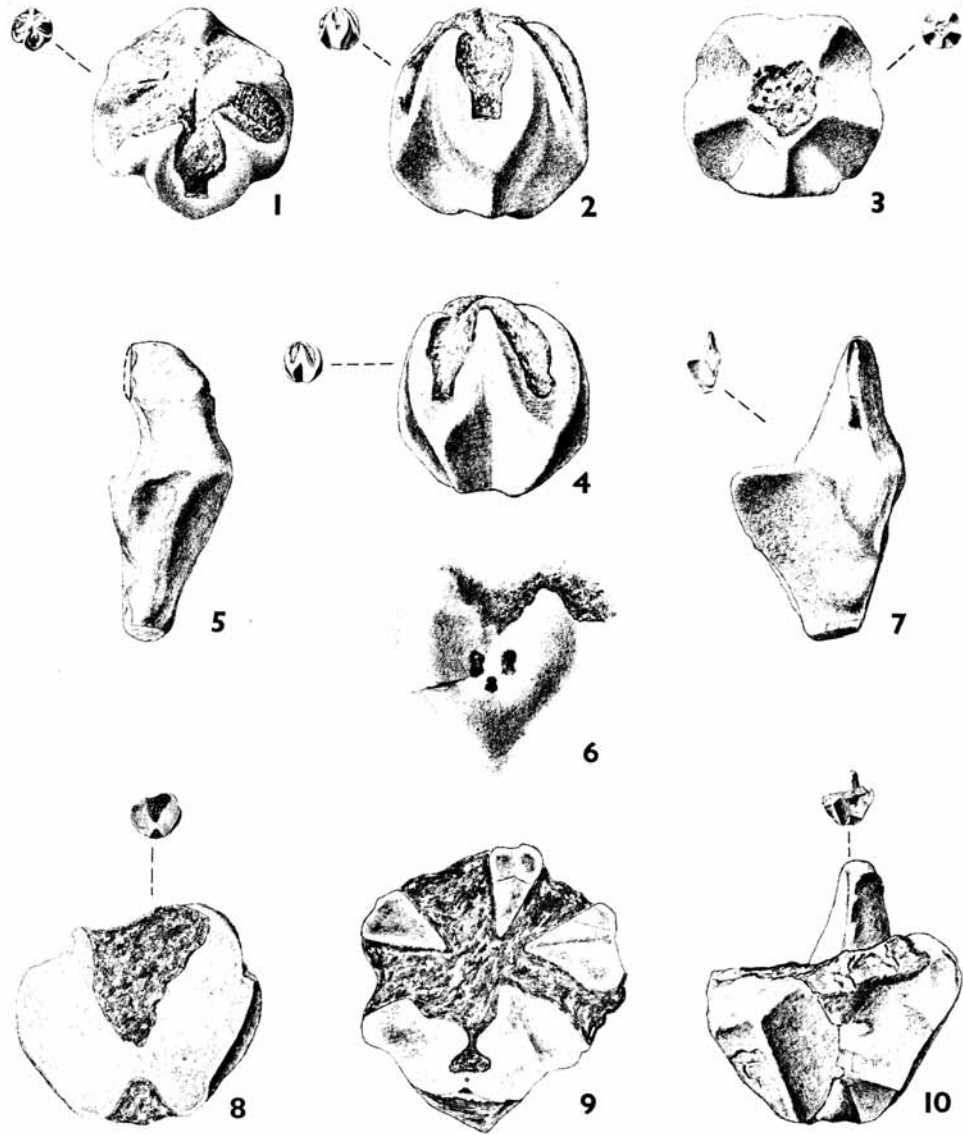
Figs. 1-10. *Phyllocrinus furcillatus* sp. nov. 1, Holotype, EC 196, ventral view. Ligament pit exposed at external margin of articular facet. 2, Holotype, lateral view. 3, Holotype, dorsal view. 4, Holotype, lateral view. As fig. 2, rotated 45° clockwise. 5, Paratype, EC 204. As for fig. 7, rotated clockwise. Supposed position of upper margin of interradial extension indicated by dotted line. 6, Paratype, EC 200. Enlargement of articular facet exposed by distortion of specimen. Ligament pit and central canal almost coalesced; kidney-shaped muscle fossae above. 7, Paratype, EC 204. Fragment with interradial extension showing form of body cavity on dorsal third. Upper two-thirds of internal edge of extension broken away. 8, Paratype, EC 202. Longitudinal section along plane through two interradial extensions. Form of body cavity and stem attachment. 9, Paratype, EC 201. Transverse section oblique to horizontal plane. With shape of interradial extensions at different levels, fusion lines through two extensions, a ligament pit and central canal. 10, Paratype, EC 203. Fragment composed of three radial plates, two of three interradial extensions broken off. Form of stem attachment, body cavity, and internal edge of extension.

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SPEDEN, *Phyllocrinus furcillatus* sp.nov.