Journal of Paleontology, 86(1), 2012, p. 126–128

0022-3360/12/0086-0126$03.00

A NEW GLYPHEID LOBSTER FROM THE LATE CRETACEOUS OF HAWKE'S BAY, NEW ZEALAND

RODNEY M. FELDMANN[1] AND JEFFREY D. STILWELL[2,3]

[1]Department of Geology, Kent State University, Kent, OH 44242 USA, <rfeldman@kent.edu>; [2]School of Geosciences, Monash University, Clayton VIC 3800, Australia; and [3]Australian Museum, 6 College Street, Sydney NSW 2000, Australia, <Jeffrey.Stilwell@monash.edu>

ABSTRACT—Recognition of a fossil previously identified as a ''large Cretaceous beetle'' as a glypheid lobster permits the definition of a new species, *Glyphea wiffenae.* The specimen was collected from the richly fossiliferous, Upper Cretaceous Maungataniwa Sandstone in eastern North Island, New Zealand. Several other fossil decapods with high southern latitude affinities have been described previously from the unit, supporting the placement of the Zealandia region within the Weddellian Biotic Province. This is only the fourth glypheid known from New Zealand and the first Cretaceous occurrence of the genus in the country.

INTRODUCTION AND GEOLOGIC SETTING

RICHLY DIVERSE assemblages of vertebrates and invertebrates, which include a new lobster *Glyphea wiffenae* n. sp. described in this paper, of the Late Cretaceous 'Zealandia' region of Gondwana belonged to part of the widespread, southern circum-Pacific, shallow marine Weddellian Biotic Province of Zinsmeister (1979, 1982), adjacent to low-lying land stretching from what is now New Zealand to the Chatham Islands and beyond (Fig. 1). Recent evidence suggests that the Zealandian landmass was more extensive than previously supposed with an eastward-trending, narrow land bridge (Chatham Peninsula) extended some 1,000 km from what is now Banks Peninsula during the Late Cretaceous. This low-lying tract of land was still partially emergent in the Paleocene with the Zealandian landmass having been surrounded by shallow waters of high biotic productivity, reflecting associated upwelling off the coast (see Stilwell et al., 2006; Consoli and Stilwell, 2009), and the fossil record attests to these fertile waters during the latter phases of the Cretaceous and Paleogene greenhouse earth.

Transgression and slow subsidence during this time, as Zealandia diverged from West Antarctica ca. 85–80 Ma, resulted in the deposition of a ~400 m thick package of highly fossiliferous sediments (Maungataniwha Sandstone) in the Te Hoe-Mangahouanga Stream area of Hawke's Bay (Fig. 1). These clastic sequences accumulated in fully marine, shallow conditions, inferred to be a bay, estuary or inlet (Crampton and Moore, 1990) in high southern latitudes close to 66°S (Molnar and Wiffen, 1994).

Basal Maungataniwha Sandstone facies is highly conglomeratic with interbedded sandstone and minor lenses of coal and carbonaceous mudstone and rests unconformably on Urewera Group greywackes dated to be as old as Jurassic or Early Cretaceous (Crampton and Moore, 1990). The balance of the unit is a fine- to medium-grained sandstone, which is variably soft and massive to poorly bedded. The fossil lobster from this paper (Fig. 2) was collected in the less-well indurated, heavily bioturbated sediments rich in calcareous concretions up to 2 m diameter (also local concentrations of phosphorite nodules and pyrite concretions), containing diverse macroinvertebrates, vertebrates and plant remains. The Maungataniwha Sandstone, one of the most fossiliferous sequences in the Cretaceous of New Zealand, is disconformably overlain by the Rakauroa Mudstone Member of the Whangai Formation. First collected in 1974, the Maungataniwha Sandstone has yielded a host of non-avian dinosaurs, marine reptiles, pterosaurs, turtles, and invertebrates, including previously described crustaceans *Haumuriaegla glaessneri* Feldmann, 1984; *Notiodromia novaezelandica* (Feldmann, 1993), as *Homolodromia*; *Torynomma planata* Feldmann, 1993; *Eodorippe spedeni* Glaessner, 1980; *Hoploparia* sp.; *Linuparus* sp.; and an erymid and a thalassinoid (Feldmann and Keyes, 1992).

AGE

Recent strategies to improve the age control on fossil-bearing strata of the Maungataniwha Sandstone Member of the Tahora Formation have been met with success, better pinpointing the substantial span of ages given by previous attempts as various stages within the Late Cretaceous. Independently, Young and Hannah (2010) and Vajda and Raine (2010) have identified suites of terrestrial pollen and spores and marine dinoflagellates in targeted samples that span the age range of the Maungataniwha Sandstone Member. These studies confirm an age range of early Campanian to early Maastrichtian for the unit with palynofacies and inclusive representative taxa corresponding to the dinocyst *Vozzhennikovia spinulosa–Isabelidinium pellucidum* zonal interval. Although the new glypheid described here was not collected in a particular section, its age can be readily constrained with confidence to the Campanian–early Maastrichtian.

SYSTEMATIC PALEONTOLOGY

Order DECAPODA Latreille, 1802
Superfamily GLYPHEOIDEA Winkler, 1883
Family GLYPHEIDAE Winkler, 1883
GLYPHEA von Meyer, 1835

Type species.—*Palinurus regleyanus* Desmarest, 1822, by original designation.

Included species.—See Schweitzer et al. (2010).

Diagnosis.—Carapace subcylindrical, compressed laterally, rostrum simple, pointed; cephalic region with longitudinal, tuberculate carinae; cervical groove well developed, steeply inclined to long axis, but not perpendicular to it; postcervical groove variably developed, often converges with branchiocardiac groove posteriorly and sometimes mesially; branchiocardiac groove well developed, approaches midline at low angle; epibranchial region with narrow anterior extension; epistome swollen, prominent; telson rounded; uropods with diaresis; first pereiopod pseudochelate.

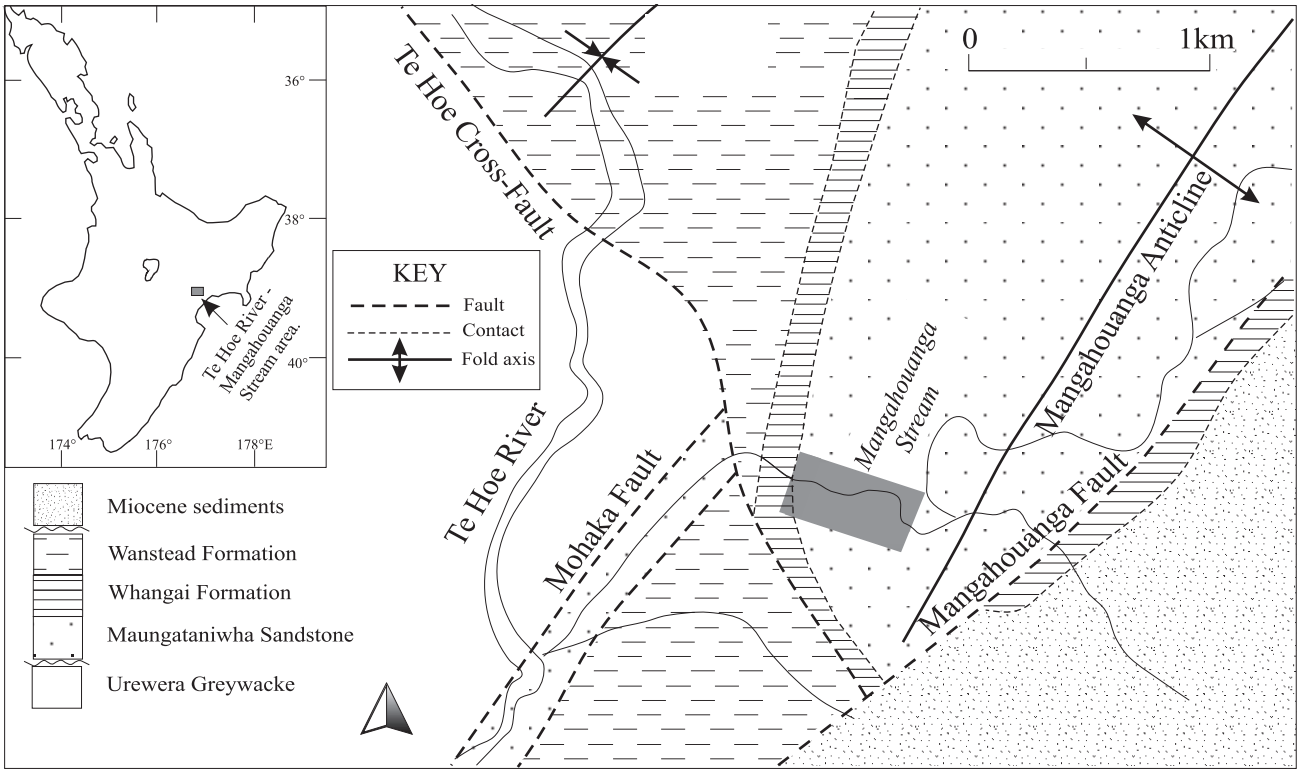

FIGURE 1—Geologic map of a portion of North Island, New Zealand with locality Mangahouanga Stream highlighted. Map courtesy of M. Young and M. Hannah.

GLYPHEA WIFFENAE new species
Figure 2

Diagnosis.—Short, stout glypheid with nearly obscure postcervical groove; and deep, short branchial region more coarsely ornamented ventrally, becoming nearly smooth dorsally.

Description.—Moderately large sized glypheid, short, stout, with nearly obscure postcervical groove and branchiocardiac groove that becomes obscure as it approaches midline.

Carapace 36.2 mm long, excluding rostrum which is not preserved; 23.0 mm high measured nearly at posterodorsal corner. Dorsal margin straight, 31.9 mm long, excluding rostrum. Posterior margin with well defined marginal groove narrowing at posteroventral corner; marginal carina arises about one-quarter the height from dorsal margin and continues at least to posteroventral corner. Ventral margin smoothly convex to cervical groove where it becomes weakly concave and sloping dorsally. Front about 8.8 mm high, rimmed, weakly concave forward to base of rostrum which is missing.

Cephalic region bounded by deep, sinuous cervical groove intercepting dorsal margin at about 60° angle curving in convex forward arc to about midheight and in concave forward arc to ventral border. Three well-defined, granular carinae extend from cervical groove to anterior margin. Subdorsal carina narrow, extends anterodorsally to presumed base of rostrum. Supraorbital carina the most prominent of

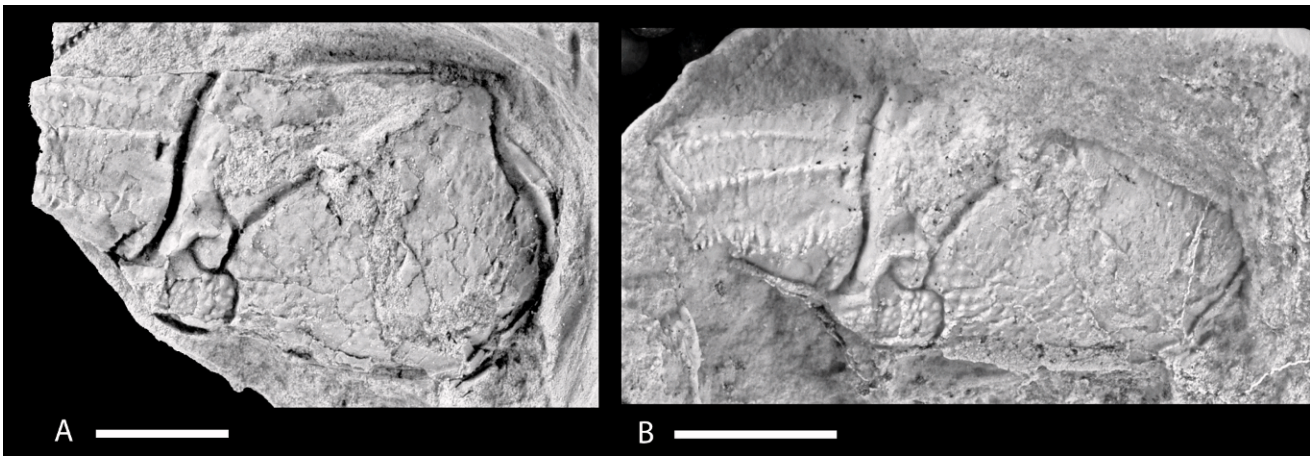

FIGURE 2—*Glyphea wiffenae* new species. *A*, left lateral aspect of the carapace of holotype AR 2172 (GNS Science type collection number); *B*, Exaflex cast of counterpart of holotype showing left lateral aspect of the carapace. Scale bars=1 cm.

https://doi.org/10.1666/11-057.1 Published online by Cambridge University Press

the three, extends parallel to dorsal midline. Antennal carina broad with rounded axis, generally parallel supraorbital carina.

Thoracic region with very weak postcervical groove inclined toward, but not reaching, dorsal midline at about 35° angle, curving ventrally to intercept stronger branchiocardiac groove at nearly right angles. Branchiocardiac groove nearly straight, moderately well developed ventrally and becoming obscure before reaching dorsum. Adductor testis muscle position marked by inflated region with crescentic hood dorsally and circular swollen area ventrally. Inferior groove concave forward defining posterior limit of elongate swollen area extending at least to cervical groove.

Carapace subtly rugose over most of surface but nodose on ventral swelling. An 11 mm length of slender annulations extends posterodorsally from near the front and presumed to be part of the antennal flagellum. Abdomen and appendages not preserved.

Etymology.—The trivial name recognizes the late Joan Wiffen, collector of the specimen and long-time avid fossil collector.

Types.—AR 2172 (GNS Science type collection number).

Locality.—Just above bridge (no longer in existence) over Mangahouanga Stream, just above huts, in softer bedded sediments, Hawkes Bay; New Zealand Map Grid reference (V19) 2841700 6247100 [fossil record number V19/f0344], equivalent to 39.91814°S 176,82526°E (NZGD49); collected by J. Wiffen, 28 January 1992, and tentatively identified as 'Large Cretaceous beetle.'

Occurrence.—Fossil collected in situ from moderately well indurated, very fine- grained, medium grey-brown, carbonaceous, marine sandstone in the Mangataniwha Sandstone, dated as Late Cretaceous in age (*Vozzhennikovia spinulosa–Isabelidinium pellucidum* zonal interval (=lower to upper Haumurian Stage, equivalent to early Campanian to early Maastrichtian, Young and Hannah, 2010; see also Vajda and Raine, 2010)).

Discussion.—Recognition of this specimen as a new species of glypheid marks only the fourth occurrence of Glypheidae in New Zealand. Glaessner (1960) named a new species *Glypheopsis anntipodum* from the Jurassic, the genus of which has now been synonymized with *Trachysomma* Bell, 1858. Subsequently, Feldmann (1993) described the first representative of *Glyphea* from the Wangaloan, early Paleocene, of New Zealand, *G. stilwelli*; and Feldmann and Maxwell (1999) named *G. christeyi* for a Bortonian, Eocene, specimen. Thus, the discovery is significant.

Glyphea wiffenae can be distinguished from *G. christeyi* based upon the overall form and development of the postcervical groove. *Glyphea christeyi* is much more slender than *G. wiffenae* and the postcervical groove is deep and nearly parallels the branchiocardiac groove for its entire length.

Glyphea wiffenae is readily distinguished from *G. stilwelli* as the latter exhibits a much stronger, more complex postcervical groove and the branchiocardiac groove approaches the dorsal surface at a much more anterior position than it does in *G. wiffenae*. The branchiocardiac groove approaches the midline nearly at the posterior border, a feature that serves to distinguish it from all other members of the genus. That feature, coupled with the very short, deep branchial region further distinguishes this new species from all others.

ACKNOWLEDGMENTS

Special thanks are owed to J. Simes (GNS Science, New Zealand), M. Young (CSIRO, Australia) and M. Hannah (Victoria University of Wellington, New Zealand). Funding was provided by NSF grant EF 0531670 to R. F. and C. E. Schweitzer, and a Monash University Research Initiatives grant to J. S. We appreciate the thoughtful reviews of this paper by J. W. M. Jagt and H. Karasawa, and JP editors B. Huber and K. Huber, which have enhanced this new contribution.

REFERENCES

BELL, T. 1858. A monograph of the fossil malacostracous Crustacea of Great Britain, Pt. I, Crustacea of the London Clay. Monograph of the Palaeontographical Society, London for 1856, 10:i–viii, 1–44, 11 pls.

CONSOLI, C. P. AND J. D. STILWELL. 2009. Late Cretaceous marine reptiles (Elasmosauridae and Mosasauridae) of the Chatham Islands, New Zealand. Cretaceous Research, 30:991–999.

CRAMPTON, J. S. AND P. R. MOORE. 1990. Environment of deposition of the Maungataniwha Sandstone (Late Cretaceous), Te Hoe area, western Hawke's Bay, New Zealand. New Zealand Journal of Geology and Geophysics, 33:333–348.

DESMAREST, A. G. 1822. Histoire naturelle des Crustacés fossiles. Les Crustacés proprement dits. F. G. Levrault, Paris, p. 67–154, pls. 5–11.

FELDMANN, R. M. 1993. Additions to the fossil decapod crustacean fauna of New Zealand. New Zealand Journal of Geology and Geophysics, 36:201–211.

FELDMANN, R. M. AND I. W. KEYES. 1992. Systematic and stratigraphic review with catalogue and locality index of the Mesozoic and Cenooic decapod Crustacea of New Zealand. New Zealand Geological Survey Record, 45:1–73.

FELDMANN, R. M. AND P. R. MAXWELL. 1999. A new species of glypheid lobster, *Glyphea christeyi* (Decapoda: Palinura), from the Eocene (Bortonian) Waihao Greensand, South Canterbury, New Zealand. New Zealand Journal of Geology and Geophysics, 42:75–78.

GLAESSNER, M. F. 1960. The fossil decapod Crustacea of New Zealand and the evolution of the Order Decapoda. New Zealand Geological Survey Paleontological Bulletin, 31:3–79.

GLAESSNER, M. F. 1980. New Cretaceous and Tertiary crabs (Crustacea: Brachyura) from Australia and New Zealand. Transactions of the Royal Society of South Australia, 104:171–192.

LATREILLE, P. A. 1802–1803. Histoire naturelle, générale et particulière, des Crustacés et des Insectes, 3:1–468. F. Dufart, Paris.

MOLNAR, R. E. AND J. WIFFEN. 1994. A Late Cretaceous polar dinosaur fauna from New Zealand. Cretaceous Research, 15:689–706.

SCHWEITZER, C. E., R. M. FELDMANN, A. GARASSINO, H. KARASAWA, AND G. SCHWEIGERT. 2010. Systematic list of fossil decapod crustacean species. Crustaceana Monographs, 10:1–222.

STILWELL, J. D., C. P. CONSOLI, R. SUTHERLAND, S. SALISBURY, T. H. RICH, P. A. VICKERS-RICH, P. J. CURRIE, AND G. J. WILSON. 2006. Dinosaur sanctuary on the Chatham Islands, Southwest Pacific: first record of theropods from the K–T boundary Takatika Grit. Palaeogeography, Palaeoclimatology, Palaeoecology, 230:243–250.

VAJDA, V. AND I. RAINE. 2010. A palynological investigation of plesiosaur-bearing rocks from the Upper Cretaceous Tahora Formation, Mangahouanga, New Zealand. Alcheringa, 34:359–374.

VON MEYER, H. 1835. Briefliche Mitteilungen. *In* Neues Jahrbuch für Mineralogie, Geologie, Geognosie, und Petrefaktenkunde, 1834:329. C. F. Winter, Stuttgart.

WINCKLER, T.-C. 1883. Étude carcinologique sur les genres "*Pemphix*," "*Glyphea*" et "*Araeosternus*." Archive du Musée Teyler, 2:73–124.

YOUNG, M. D. AND M. J. HANNAH. 2010. Dinoflagellate biostratigraphy of the vertebrate fossil-bearing Maungataniwha Sandstone, northwest Hawke's Bay, New Zealand. New Zealand Journal of Geology and Geophysics, 53:1–87.

ZINSMEISTER, W. J. 1979. Biogeographic significance of the late Mesozoic and early Tertiary faunas of Seymour Island (Antarctic Peninsula), p. 349–355. *In* J. Gray and A. J. Boucot (eds), Historical Biogeography, Plate Tectonics and the Changing Environment. Proceedings of the 37th Annual Biology Colloquium and Selected Papers, Oregon University Press, Corvallis.

ZINSMEISTER, W. J. 1982. Late Cretaceous–early Tertiary molluscan biogeography of the southern circum-Pacific. Journal of Paleontology, 56:84–102.

ACCEPTED 1 SEPTEMBER 2011