A New Fossil Gasteropod from New Zealand.

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THROUGH the kindness of Mr. John Marwick the writer has been able to study a small series of fossil gasteropods collected recently by Mr. M. Ongley, of the New Zealand Geological Survey. The fossils were collected from some limestones in the Mangarua Creek, in the Tapuwaeroa Valley of the East Cape District, North Island. Mr. Marwick informs me that "no work has been done on the fauna of the beds from which the specimens come, so the age cannot be stated. It has generally been considered as Cretaceous (probably Lower), because of the frequent occurrence of large *Inoceramus;* several of the Mollusca seem to have Jurassic affinities, so the horizon is an open question."

The material submitted to the writer included about thirty more or less fragmentary gasteropods, most of which were embedded in a peculiarly hard pale-blue limestone. With the gasteropods were fragments of several lamellibranchs, including *Inoceramus.*

The writer believes that the gasteropods are distinct from any species that have hitherto been described; they are here called *Katosira obliquestriata* n. sp. No one specimen exhibits all the characters, but as the specimens vary considerably among themselves it will be advantageous first to describe the holotype in detail.

Katosira obliquestriata n. sp.

Dimensions of holotype: Length of shell (estimated), 35 mm.; width of shell, 33 per cent.; length of spire, ? 70 per cent.; spiral angle, 106°; apical angle, 24°.

The holotype (fig. *a*) is a fairly complete specimen, but the uppermost whorls are missing, as in all other large specimens that have been extracted from the matrix. Whorls are rather flat, the widest part being near anterior end; sutures are shallow, and there is a tendency for last whorl to be moulded on preceding whorl.

Shell practically smooth; ornament consists of very fine axial striae and a few faint spirals. Axial striae regularly spaced, and after curving slightly to right from posterior border they swing very sharply to left and cross whorl with a marked obliquity. Spirals are few in number, and exceedingly faint except near sutures.

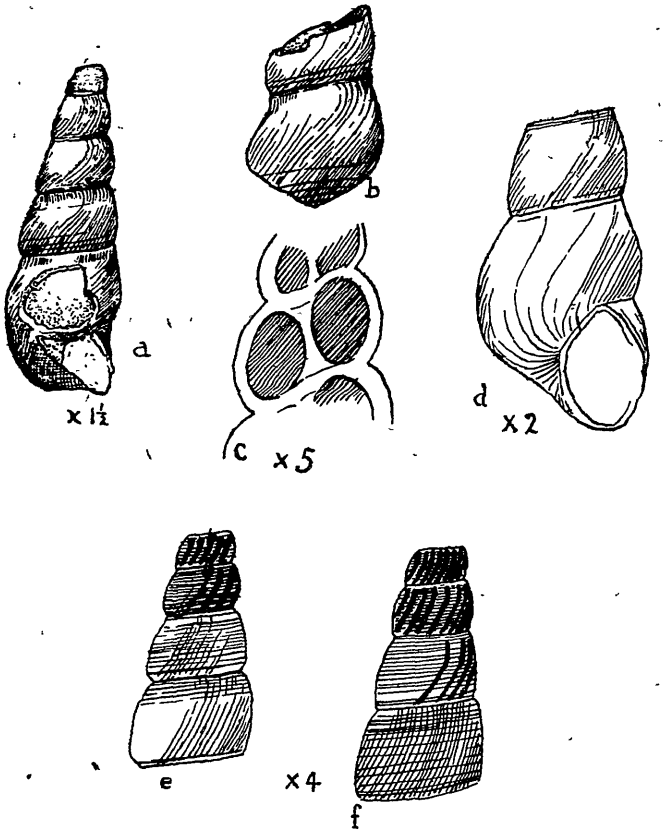
Six whorls present in holotype. These show a slight change in whorl-shape during development, earlier whorls being somewhat flatter than later. Except for the strengthening of spirals near sutures in later whorls, there is no change in character of ornamentation in whorls that are preserved. Anterior part of last whorl (the underside or base of shell) bears axial striations crossed by extremely faint spirals.

The shell is unusually thick.

Holotype: The holotype is in the N.Z. Geological Survey collection. A topotype has also been presented to the British Museum of Natural History.

Several additional features are better shown by other fragments. On two the form of the aperture can be made out, though it is not quite complete in any specimen. It is oval in shape, and appears to be quite holostome, with no trace of a sinuosity (fig. *d*).

Several specimens have been sectioned, and these show that the columella is solid, and oblique to the axis of the shell, although the degree of obliquity varies somewhat in different individuals (fig. *c*).



Katosira obliquestriata n. sp. *a*, holotype; *b*, a specimen showing embracing whorls; *c*, section of a shell to show the columella; *d*, a specimen showing form of aperture (slightly restored); *e*, *f*, diagram of ornamentation on upper whorls (*f*, a paratype).

One specimen, represented only by a single whorl, indicates that the species attained a much larger size than is shown by the holotype; its length may have been more than 60 mm.

Some smaller fragments show the earlier whorls. Two such are shown in figs. *e* and *f*; the latter will be taken as a paratype. The protoconch is not preserved, and the earliest whorl is perhaps the third. This is ornamented by about eight fine regularly-placed spirals, crossed by a number of strong axial costae, which are most pronounced near posterior border, and which are sharply inclined across whorl. On succeeding whorl ornamentation is of the same character, but costae are not quite as strong and are more widely spaced, while spirals are more numerous. On a later (? fifth) whorl costae are replaced by low folds or subcostae, and

ultimately disappear completely, sixth whorl being ornamented only by spiral lines and oblique growth-lines. On this whorl the spirals are very fine and numerous, those near sutures being somewhat stronger than those on middle of whorl. It may be suggested that this corresponds with the earliest whorl shown imperfectly in holotype.

The ontogeny of *K. obliquestriata* may therefore be summarized as follows :—

	Ornamentation.*	Whorl-shape.
Protoconch ..	Unknown	Unknown.
? Third whorl ..	Axial costae and spirals ..	Round.
Fourth whorl ..	Feebler costae and spirals ..	Round.
Fifth whorl ..	Spirals and subcostae ..	Round.
Sixth whorl ..	Growth-lines and spirals ..	Flatter.
Seventh to tenth whorl	Growth-lines and spirals near sutures	Flat.
Eleventh whorl ..	Growth-lines and spirals near sutures	More tumid; whorls embracing.

Variations.—As remarked, there is considerable variation among the specimens, even in one piece of matrix. This is chiefly due to the acceleration or retardation of those progressive characters that are summarized in the above table. Thus in some specimens the whorl-shape at any given stage is more or less advanced than indicated in the table. As the acceleration of ornament takes place independently of the changes in whorl-shape, a great number of variants may be recognized. In some specimens the whorls remain flat throughout, and there appears to be no tendency for the whorls to be moulded on the preceding ones: in other specimens this stage is attained by the sixth or seventh whorl.

The variation in acceleration of ornamentation is equally distinct. For instance, fig. *e* illustrates the early whorls of a specimen in which the costate stage is lost by the fourth whorl; in several specimens the stage with spirals is retained until the seventh or eighth whorl.

These differences are in several cases so pronounced as to suggest that more than one species is present. Indeed, at one stage in the investigation, before the more complete material had been received, the writer was disposed to refer the fragments to at least two species of different genera. As they occur together, however, and as the variation in each character appears to be continuous, it is more satisfactory to regard them as members of one gens or species-group. The writer believes that members of the same species-group collected at one horizon not infrequently show such differences, due to differential acceleration of progressive characters. Such differences in isochronous members of one "lineage" have been noted in several divisions of the Mollusca.

It may be admitted that there is a possibility that the specimens dealt with are not strictly isochronous; the limestone may contain fossils of slightly different dates; but, as the specimens are identical in preservation and appearance, it is safer to consider them as contemporaneous until evidence to the contrary is found.

Generic Position.—Mesozoic turriculate gasteropods with predominant axial ornament were formerly placed in *Chemnitzia* or in *Pseudomelania*. *Pseudomelania* is taken to include smooth shells with growth-lines almost straight, while smooth or costate shells in which the axials showed a sinuosity were placed in *Chemnitzia*.

* The more prominent feature in the ornamentation is given first in each case.

It is apparent that the shells now under consideration must be grouped with *Chemnitzia* s.l.—that is, with the family of Loxonematidae—since the growth-striae are far from straight, and since they show costae at one stage of growth. This conclusion is further supported by the obliquity of the columella, and by the tendency of the later whorls to mould themselves on the preceding whorls, a frequent feature of the Loxonematidae.

The genera of this family have been summarized by Dr. A. E. M. Cossmann (1). Miss McDonald and the writer consider that some of the genera are artificial, and, provisionally, are inclined to use the following for Mesozoic gasteropods (2) :—

Zygopleura : Whorls convex, sinuous axials, no spirals.
Katosira : As above, but with spirals.
Hypsipleura : Whorls flat, axial ribs straight.

While it is admitted that these genera are far too comprehensive, it is clear that the species from New Zealand must be grouped with *Katosira*, and, indeed, *K. obliquestriata* resembles broadly many catagenetic species of *Katosira* found in the Jurassic rocks of Europe. It differs from all those known to the author in the greater obliquity of its growth-lines. In particular, *K. obliquestriata* resembles some of the species placed by Cossmann in the genus *Anoptychia*, and it may possibly be a derivative of some of these.

The writer therefore regards *Katosira obliquestriata* as a very advanced member of the Loxonematidae, which apparently is rapidly progressing to a non-costate shell. It is not unlikely that *Pseudomelania* (or at least many Jurassic and Cretaceous species referred to that genus) evolved in this way, perhaps at different times, from Loxonematids. But *Katosira obliquestriata* can scarcely have led to a shell with the growth-lines of *Pseudomelania*, and it may perhaps be considered as a parallel development. The Scalidae arose at about the same time as a development of the Loxonematidae (3), but these are characterized by the strengthening of the axial ribs, and the New Zealand specimens must not be regarded as in any way related to such early members of the Scalidae as *Proscala* (4), which is anageneric, progressing from smooth to costate.

Age.—It is to be regretted that these gasteropods afford no reliable evidence of the age of the rocks where they were obtained. Clearly, they resemble Jurassic rather than Cretaceous gasteropods, yet members of the Loxonematidae are not unknown from Cretaceous rocks. Unfortunately, Cretaceous gasteropods are often so badly preserved that their relations cannot properly be made out. Cretaceous shells which should apparently be referred to the Loxonematidae have been described by Stanton (5) and Stoliczka (6), among others, but these shells are costate throughout and are without the oblique growth-lines that characterize *K. obliquestriata.*

The discovery of gasteropods with such distinctly Jurassic affinities in rocks that may be of Cretaceous age is interesting in view of the suggestion, recently disputed by Dr. Trechmann (7), that New Zealand faunas often show archaic features.

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