ON THE OCCURRENCE OF *PERISPHINCTES* (S. S.) FROM THE OZIKA PENINSULA IN THE SOUTHERN KITAKAMI MOUNTAINLAND.

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Perisphinctes are common in the Upper Jurassic formation in the southern Kitakami Mountain land, but the greater part of these specimens remains undescribed.

In recent years the Jurassic stratigraphy of the southern Kitakami Mountain-land has made the rapid progress and at the same time, such *Perisphinctes* of Kimmeridgian-Argovian type as *Ataxioceras*, *Discosphinctes*, *Biplices*, *Lithacoceras*, *Aulacosphinctoides*, *Torquatisphinctes*, *Paraboliceras*, *Virgatosphinctes* have been discovered from the several localities of this province.

During the writer was carrying on a geological survey in the Ozika Peninsula in the Province of Rikuzen, he collected several peculiar *Perisphinctes* among which the gigant *Perisphinctes* (*s. s.*) were found.

Up to the present time, *Perisphinctes* (*Kranaosphinctes*) cfr. *matsushimai* YOK. as a *Perisphinctes* of plicatilis-type was ever reported by the several investigators from the Ozika Peninsula, and this *Kranaosphinctes cfr. matsushimai* YOK. shows a great resemblance to *P.* (*K.*) *matsushimai* YOK. which was ever described by M. YOKOYAMA from Tetori series.

The new occurence of *Perisphinctes* (*sensu stricto*) from the Ozika Peninsula gives the epoch-making significance for the Upper Jurassic Biostratigraphy in Japan, because *Perisphinctes* (*s. s.*) is an indexfossil of Perarmatum and Transversarium zone of Lower Oxfordian stage.

Sub-genus Perisphinctes (s. s.) Waagen emend. S. BUCKMAN

Type ; *Am. biplex* J. SOWERBY

The holotype of *biplex* J. SOWBERBY being a fragmentary and distorted specimen unfit for specific or generic identification, the writer

interprets *Perisphinctes* (s. s.) by *Perisphinctes variocostatus* which is now considered conspecific with *P. biplex*.

The shell is very evolute, with wide, shallow umbilicus, at all stages. The whorl-section is quadrate, becoming depressed later with divergent sides and wide, flat venter.

The umbilical area is smooth and sharply demarcated. The primary ribs are regular, rectiradiate, prominent. The point of furcation is placed high up, on the peripheral margin. At a diameter of 180-200 mm, the ribs suddenly become enormouoly swollen, more or less wedge-shaped and widely-spaced, apparently by the bundling together of three or four of the ordinary ribs. The last whorl of the adult may bear only from twelve to twenty of these modified cuneiform ribs, as compared with up to sixty ordinary primary ribs on the penultimate whorl. With the modification of the primary ribs the secondaries die out, leaving the venter smooth and flattened. The modified ribs are at first narrowly, later broadly, cuneiform.

Constrictions are absent on all the material, except in the center or the umbilicus, where shallow and narrow ones are desernible at intervals up to a diameter of about 15 mm. No lappets are known.

The septal sutures are characterized by moderately long lobes with rather florid outline. The formula is EL = N > L passing later to EL = L = N. The suspensive lobe is steep and auxiliaries rather small, only one large, between two that are dwarfed.

The fourth is minute. This gigant *Perisphinctes* (s. s.) is one of the commonest of all the English Corallian *Perisphinctids*.

Perisphictes (Perisphinctes) ozikaensis Fukada. new species

Plate I, Fig. 1

Description of the holotype:— The shell is distinctly evolute, wide umbilical, consisting about 7 or 8 whorls. The inner whorls are rounded-quadrate in section with rounded umbilical margin and deep umbilical area set at right angles to the whorl sides.

The last body whorl is quadrate to depressed, the venter (is) broad and gently rounded with flattened sides. The primary ribs originate at the umbilical suture which are well marked on the umbilical area, swing forward on the umbilical margin and cross the whorl sides quite straight in a radial direction (rectiradiate) but with a somewhat marked forward inclination. The ribs in the inner whorls are comparatively sharp.

They attain a maximum of about 55 to the whorl at a major diameter of 182 mm. The point of bifurcation is always well overlapped by the succeeding whorl, so that no secondaries are visible on the umbilicus.

By the time the venter emerges from the enwrapping body-whorl, the primary ribs suddenly undergo modification to much larger and more widely-spaced cuneiform ridges. The ribs suddenly become enormously swollen, more or less wedge-shaped and widely-spaced, apparently by the bundling together of three or four of ordinary ribs. With the modification of the primary ribs the secondaries die out, leaving the venter smooth and flattened. Constrictions and oblique simple ribs are absent, except on the inner whorls. Septal sutures are invisible in our specimen.

Dimensions and observations:—

As our specimen is strongly deformed secondarily by a lateral compression which is a common characteristic feature among all the specimens from this region, the accurate dimensions can't be measured. Its approximate dimensions of this specimen are as follows;

maximum measuarable diameter	495 mm.
major diameter of the umbilicus	327 mm.
minor diameter of the umbilicus	147 mm.
the number of ribs of the last whorl	about 24
the number of ribs of the penultimate whorl	about 55
the number of ribs of the whorl preceding to the penultimate whorl	about 54
the number of ribs of the inner whorl	about 54

Our specimen being unfortunately only a negative impression, the thickness is acctually not measurable but it is presumed that the section of the last whorl would be approximately depressed, notably on the peripheral side.

Though this specimen is incomplete and the body whorl near the aperture is broken off, it presumed that the modification of the primary ribs would be increasingly distinct.

Comparison:

As these characters are guite similar to the generic one of *Perisphinctes* (s. s.) it is certain that this gigant *Perisphinctes* belongs to the "*variocostates*" such as *P. martelli* (Oppel), *P. parandieri* de Loriol and *P. variocostatus* (Buckland) whose costation is characterized by the profound modification near the beginning of the last whorl. These "*variocostates*" form a natural group, for which Schindewolf introduced

the subgeneric name *Martelliceras* with *P. martelli* as genotype. BUCKMAN having, however, unknown to SCHINDEWOLF, designated one of the same group as genolectotype of *Perisphinctes*. *Martelliceras* is a synonym of *Perisphinctes* (s. s.).

This specimen shows a great resemblance to *Perisphinctes uptonensis* Arkell which occured from the Trigonia clavellata beds of Dorset Coast.

The difference between our specimen and the English specimen is as follows;

I) The radial ribs of *Perisphinctes uptonensis* is more inclined forward than our specimen.

II) The enormous cuneiform modified ribs of the former are much wider and more distantly spaced, and the modified ribs of the latter are more or less highly swelled at about 1/3 distance from the umbilical margin.

Perisphinctes variocostatus which was described from the ampthill clay of upper Corallian beds by Miss Maud Healey has some constrictions accompanied by triplicated ribs in the inner whorls and our specimen differs from *Perisphinctes martelli* OPPEL in the more rapid modification and the much more ribbing in the inner whorls.

Locality and stratigraphical position;

This specimen was seventy years ago drawned up from the sea-bottom of about five hundred meters north-east of Makinohama village and from then, this peculiar gigant ammonite had been dedicated to the Makinohama shrine respectfully. The present time this specimen is exhibited in the Geological Institute, University of Tokyo. Judging from this rock facies of this specimen the writer presumed that this came from the middle part of the Oginohama formation exposing at the sea-shore cliff near Makinohama.

The fragment of the another specimen which is quite considered as the same species was found by the writer from Aritahama corresponding to NNE trend of Makinohama.

Perisphinctes (Perisphinctes) aff. ozikaensis FUKADA

Plate, I, Fig. 2

Remarks; This specimen is also strongly deformed secondarily by a lateral compression and unfortunately the last body whorl of the spire is not preserved. But nevertheless, it shows good agreement with the preceding holotype specimen in its wide umbilicus, sharp and crowded ribs, in the inner whorls and the modification of the primary ribs in

the outer whorls.

The primary ribs are more or less rounded, rather dense in the umbilicus counting 65 in the inner whorls.

They branch off into six or seven secondaries where secondaries first become visible. They sweep forward on the earlier whorls but straighten on the outer whorls. The points of furcation coincide with the line of involution, no secondaries being visible in the umbilicus.

Constrictions are deep and oblique accompanied by oblique simple ribs in the inner whorls, numbering two or three per whorl.

On the surface of the ornamentation the trace of the septal sutures is observed.

One of the notable difference from the holotype is the density of ribbing and the less coiling of whorls in the umbilicus.

This specimen agrees, within the limits of specific identity, with the holotype specimen from Makinohama.

Locality ····· This specimen was found by the villager from the back of the isolation-hospital near Oginohama. Though the accurate occurrence is uncertain it seems that the horizon of this specimen is roughly corresponding to the one of the preceding *Perisphinctes*.

Finally a brief note must be given on the problem about the occurrence of these *Perisphinctids* in the Ozika Peninsula.

According to W. J. Arkell, *Perisphinctids* from the Corallian formation were divided into the following two groups, based on combinations of the characters of the sutures and the costations at all stages.

Group I); Shell small to medium-sized; ribs modify only slightly near aperture of adult; suspensive love short to medium; constrictions usually conspicuous, but sometimes absent; lappets usually, if not always, present. Example; *Biplices*, *Discosphinctes*, *Planites*, etc.

Group II); Shell large, often gigant; ribs modify, either suddenly or gradually to large simple ridges or wedges on the outer whorl, with loss of secondaries; sutures generally florid with long lobes; constrictions absent from adult body-chamber; lappets absent in the adult. Example; *Perisphinctes* (*s. .s*), *Arisphinctes*, *Kranaosphinctes*, etc.

In the Ozika Peninsula, above all, *Perisphictids* belonging to the Group II such as *Perisphinctes* (*s. s.*), *Kranaosphinctes*, *Arisphinctes* are found from the several horizones of upper Jurassic Hashiura group which is consist of Samuraihama (450 m), Oginohama (380 m), and Kozumi (300 m) formations in ascending order.

Even if the restricted vertical distribution of these *Perisphinctids*

is still uncertain owing to the small number of occurrence, it is certain that each fossiliferous horizon is characterized by the different assemblage of *Perisphinctids*, rarely involving the long range species. In the lowest horizon among them, *Arisphinctes* is accompanied by the primitive *Perisphinctes* of *indosphinctes*-type, and in the uppermost horizon (Kozumi-Ôyagawa mountain pass) *Biplices* (*tiziani*-type) and other kimmeridgian *Perisphinctes* together with pelecypods and gastropods. *Perisphinctes* (*Perisphinctes*) *ozikaensis* n. sp. accompanied by *Kranaosphinctes cfr. matsushimai* Yok. was discovered from the major alternation of sandstone and shale about 250 m above the lowest *Arisphinctes-indosphinctes* zone.

These ammonites are restricted to the thin layers of several meters thick and always occured as a isolated individual instead of fossil bank.

Thus, it seems that the sedimentation of the Corallian Bed from which W. J. Arkell described a great number of II) group *Perisphinctids* differs from the case of the Ozika Peninsula in view of the condition of the deposits. The former is a highly condensed deposit, representing slow deposition during many hemerae, and the latter shows evidently more rapid-formed deposits.

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Plate I

Explanation of Plate

Fig. 1. *Perisphinctes* (*Perisphinctes*) *ozikaensis*, new species
Makinohama, Oginohama-mura. × 0.28

Fig. 2. *Perisphinctes* (*Perisphinctes*) *aff. ozikaensis* FUKADA
Hirohama, Oginohama. × 0.30

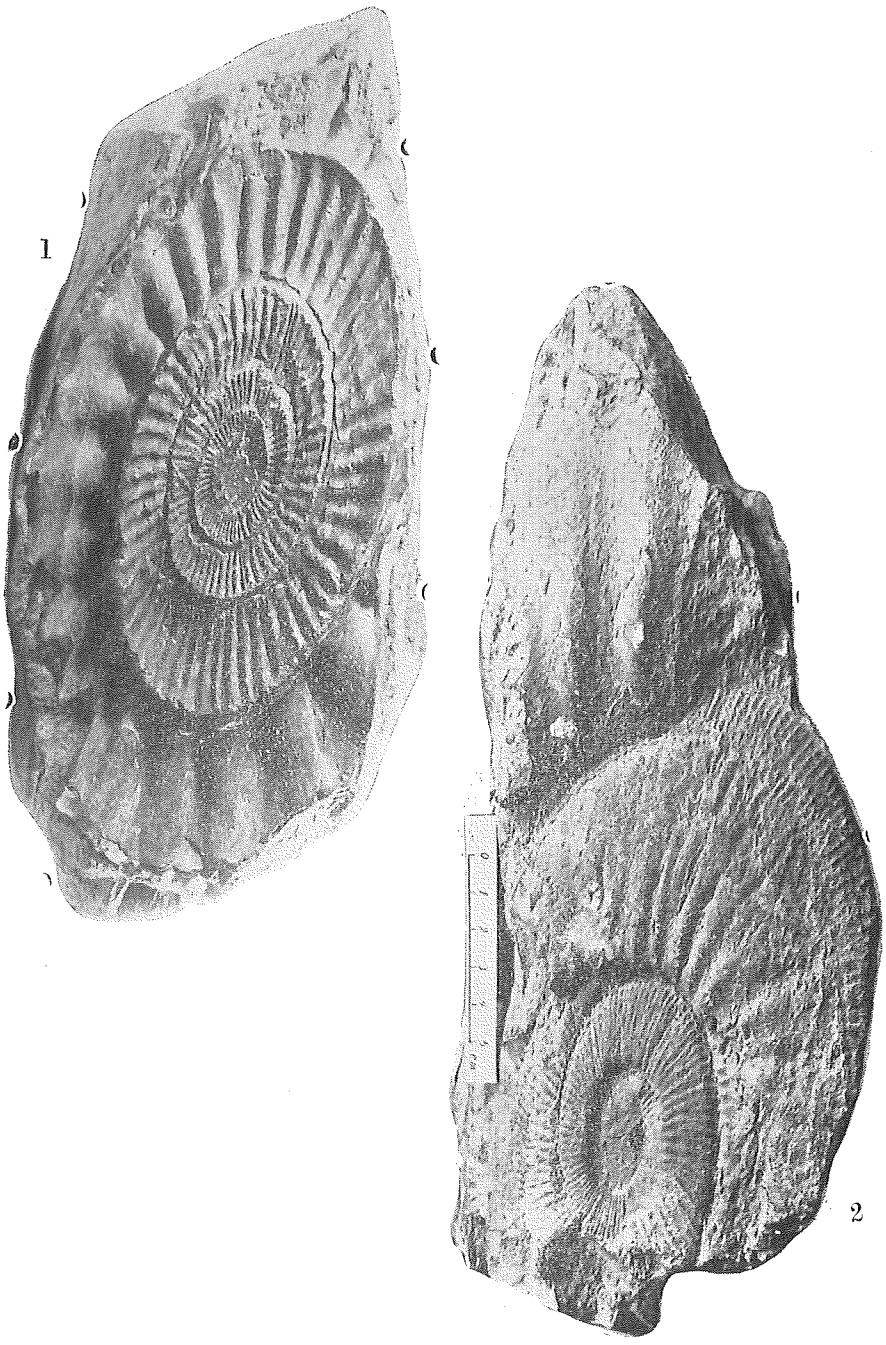

Photo. by UEKI (Fig. 1) and KUMANO (Fig. 2)