

TWO NEW GASTROPOD GENERA FROM THE LOWER SILURIAN OF THE OSLO REGION, NORWAY

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Collections from stages 6 and 7 in the Llandoveryan of the Oslo Region contain more than 30 gastropod species. Two new genera are described, a euomphalacean, *Kiaeromphalus*, and a loxonematacean, *Kjerulfonema*. The former is based on a new species and the latter on the only Silurian gastropod species that has previously been named from Norway.

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The Silurian gastropods of Norway are poorly known. To the best of our knowledge, only one species, *Murchisonia quinquecincta* Kjerulf, 1865 has been named from the Silurian of Norway, and this was figured but never described. The only information on the diversity and stratigraphic occurrence of the group consists of faunal lists compiled by Kiær (1908).

Few gastropods have been collected since the work of Kiær. We have redetermined the Llandoveryan specimens available in Paleontologisk Museum, Oslo; many may be the same specimens studied by Kiær in the preparation of his lists, but there is no way of establishing which ones he examined.

In part we have brought Kiær's lists of taxa up to date. However, two new genera have been identified among the gastropods of stages (etasjer) 6 and 7, and it seems appropriate to name them after the two geologists who have contributed to our knowledge of Silurian gastropods in Norway.

Llandoveryan gastropods

The Lower Silurian of the Oslo Region, like the underlying Cambrian and Ordovician, is divided into a sequence of numbered stages. As might be expected, the boundaries among numbered stages have been shifted by earlier workers, though the stages have been stabilized since the work by Kiær (1908). The correlation of the stages has changed. As currently understood (Bassett & Rickards 1971, p. 254), stage 6 is approximately equiv-

alent to the lower and middle Llandoveryan, and stage 7 to the upper Llandoveryan. Both of the Norwegian stages are divided into three lettered sub-stages. However, the collections do not commonly give such detailed stratigraphic information, suggesting that some of Kiær's data (1908, pp. 591, 592) were compiled from field identifications.

Kiær reported the monoplacophoran *Tryblidium unguis* Lindström 1884 from stage 7b; Lindström's species is type species of *Pilina* Koken & Perner 1925. We have been unable to find the specimen or specimens, but we have seen one example of a *Pilina*, probably a new species, in stage 6. We have excluded the hyolithids; Kiær treated these as gastropods, but we consider them to be mollusks of an extinct class. We also exclude the tentaculitids from the mollusks, although Kiær listed them as such.

In both stages 6 and 7, more gastropod taxa occur than we have identified and better preserved material should be collected to identify taxa to the species level. The specimens of gastropods in the museum collections are not presently associated with other fossils, so it is impossible to consider any aspect of community ecology or relative abundance, although it would appear that gastropods are relatively rare fossils in the Llandoveryan rocks of the Oslo Region.

In stage 6, virtually all gastropods appear to be from stage 6c, associated with a carbonate facies rather than a shaly facies (D. Worsley pers. comm.). According to Worsley, essentially no gastropods have been observed in the shales of 6a, and probably there are no early Llandoveryan specimens in the collections. The late Ordovician gastropod fauna of the Oslo Region has essentially nothing in common with the Llandoveryan gastropods except for a few long-ranging genera. The distinction may be due in part to the lack of early Llandoveryan specimens, but more likely it is due to subtle facies differences not yet understood.

Kiær (1908, p. 591, 592) reported eight gastropod taxa from stage 6, two identified to the specific level and one tentatively identified to this level. The remaining five identifications are exceedingly generalized. From stage 6, about 40 specimens are available, and no one kind predominates. We have identified the following:

- Salpingostoma* sp. indet.
- Bellerophonacean gen. indet. (two)
- Liospira* sp. indet.
- Euomphalopterus alatus* (Wahlenberg, 1818)
- Pleurotomariacean gen. indet. (two)
- Trochonema?* sp. indet.
- Anomphalacean gen. indet.
- Cyclonema* cf. *C. delicatulum* Lindström, 1884
- Cyclonema* sp. 1.
- Cyclonema* sp. 2
- Platyostoma 'cornutum'* (Hisinger, 1837)
- Kjerulfonema quinquecincta* (Kjerulf, 1865).

The faunal list from stage 6 lacks identifiable species giving any precise indication of age. *Euomphalopterus alatus* and *Platyostoma 'cornutum'* occur throughout the Silurian sequence on Gotland and have similar wide stratigraphic ranges elsewhere. *Cyclonema delicatulum* is typical of the Lower and Upper Visby Beds and Högklint Beds (uppermost Llandoveryian-lower Wenlockian) of Gotland (Lindström 1884). However, older Llandoveryian strata are not exposed on Gotland, and the lower limit of the species has not been ascertained. A somewhat similar gastropod fauna has been described from Anticosti Island by Twenhofel (1928), but distinctive elements are again absent. Lower Llandoveryian deposits in Britain and Nova Scotia are characterized by pleurotomariacean-rich faunas; *Lophospira*, *Liospira*, *Longstaffia*, and *Arjamannia* are conspicuous members, and these cannot be directly compared with the Oslo Region fauna (Longstaff 1924, McLearn 1924, Peel 1975). Similarly, there is no direct relationship with the *Hormotoma*- and *Lophospira*-dominated fauna described from 'Belfast bed' equivalents in Ohio (Foerste 1923). An undescribed early Llandoveryian fauna from extreme North Greenland contains a *Salpingostoma* reminiscent of the specimen from stage 6, but the gastropod faunas are otherwise dissimilar.

Kiær (1908 p. 591, 592) listed 16 gastropod taxa from stage 7, with one tentative and seven definite identifications to the specific level. Slightly more than twice as many specimens are available from stage 7 than from stage 6. The matrix more commonly is a solid limestone. Specimens commonly are larger than those in stage 6; many more are exfoliated, a consequence of the harder matrix of some beds in the stage. In stage 7, gastropods are particularly rare in 7c, which is a shaly facies (D. Worsley pers. comm.). As in the underlying stage, no one form of gastropod predominates. We have identified the following:

?*Prosoptychus sphaera* Lindström, 1884

'*Bellerophon*' cf. '*B.*' *squamosus* Lindström, 1884

Boiotremus longitudinalis (Lindström, 1884)

Euomphalopterus sp. indet.

Stenoloron? *aequilatera* (Wahlenberg, 1818)

Pleurotomariacean new genus, new species

Oriostoma sp. indet. [aff. *O. angulatum* (Wahlenberg, 1818)]

Kiaeromphalus kristianiensis new genus, new species

'*Euomphalus*' cf. '*E.*' *gotlandicus* Lindström 1884

Anomphalacean gen. indet. (two)

?*Gyronema carinata* (Sowerby in Murchison, 1839)

Spirina? sp. indet.

Platyceras (*Platyceras*) sp.

Platyceras (*Orthonychia*) cf. *P. (Orthonychia) enorme* Lindström, 1884

Platyostoma 'cornutum' (Hisinger, 1887)

Cyclonema cf. *C. crebristria* Sowerby of Pitcher, 1939

Hormotoma sp.

?Murchisoniid gen. indet.

Loxonema sp. indet.

Kjerulfonema quinquecincta (Kjerulf, 1865)

Subulites cf. *S. attenuatus* Lindström, 1884

Subulites sp. indet.

Indeterminate gastropods (at least three).

The gastropod fauna from stage 7 compares well with faunas described from Gotland by Lindström (1884) and from Britain by Longstaff (1924) and Pitcher (1939). '*Bellerophon*' *squamosus* is characteristic of the Högklint Beds and Lowest Slite Beds of Wenlock age but does not appear to have been recorded from the underlying Upper and Lower Visby Beds. *Prosoptychus sphaera*, *Boiotremus longitudinalis*, *Stenorolon?* *aequilatera*, *Subulites attenuatus* and '*Euomphalus*' *gotlandicus* have longer stratigraphic ranges, but together form an assemblage typical of the upper Llandoveryan-lower Wenlockian. An upper Llandoveryan fauna from western North Greenland, described by Poulsen (1974), contains *Platyostoma* '*cornutum*' and a similar species of *Cyclonema*, but is otherwise not closely comparable. *Gyronema*- and *Tritonophon*-dominated faunas from Nova Scotia (McLearn 1924, Peel 1974) and Maryland (Swartz & Prouty 1923) compare well with the upper Llandoveryan faunas of Britain (Pitcher 1939), but those species common to Britain and Oslo are seemingly absent.

Systematic descriptions

Superfamily EUOMPHALACEA de Koninck, 1881

Family EUOMPHALIDAE de Koninck, 1881

Genus *Kiaeromphalus* nov. gen.

Type species. – *Kiaeromphalus kristianiensis* nov. sp.

Diagnosis. – Low-spined, widely phaneromphalous euomphalacean, with radially elongated subsutural nodes in later whorls paralleling the oblique growth lines.

Discussion. – *Kiaeromphalus* is distinguished from *Straparollus* (*Straparollus*) de Montfort, 1810 by its oblique growth ornamentation and prominent radiating subsutural nodes. In addition, the whorl profile of the new genus is less rounded, with shallow, more open sutures and a somewhat angular periphery.

Growth lines on the upper whorl surface of *Kiaeromphalus* are prosocline, curving strongly back from the suture towards a peripheral angulation near midwhorl. The angulation may be cordlike in earlier whorls and forms the point of juncture with the following whorl. The curvature of growth lines on the upper surface and the angulation falsely suggest the presence

of a selenizone. However, in the holotype, PMO 53621, growth lines are seen to pass without deflection over the angulation.

The spurious appearance of a selenizone in *Kiaeromphalus* causes the genus to resemble superficially a number of pleurotomariaceans. Species of *Stenoloron* Oehlert, 1888 and *Pseudocryptaenia* Koken & Perner, 1925 may have similar profiles, with prosocline growth lines on the upper whorl surface, but are distinguished by the presence of an emargination high on the whorl profile. *Euomphalopterus* C. F. Roemer, 1876 and *Pleuromphalus* Perner, 1903 show a similar low-spined form, but may be distinguished by the presence of a selenizone-bearing flange at the whorl periphery.

The most common Silurian euomphalid is the highly variable *Poleumita* Clarke & Ruedemann, 1903. Species of this genus commonly have fewer, more angular whorls than *Kiaeromphalus* and are readily distinguished by their distinctive ornamentation of growth lines and lamellae crossed by strong spiral carinae.

Kiaeromphalus kristianiensis nov sp.

Description. – Low-spined, widely phaneromphalous gastropod with about five whorls; protoconch unknown. The upper whorl surface is shallowly convex and increases in curvature, with passage around the slightly angular periphery onto the uniformly convex base. The umbilicus is widely phaneromphalous, but characters of the umbilical walls are poorly known. Later whorls show a slightly shouldered profile. The aperture is poorly known, but seemingly oval with width somewhat greater than height. Growth lines on the upper whorl surface indicate a strongly prosocline outer lip; the form of the basal lip is not known. Ornamentation consists of closely spaced growth lines and regularly spaced elongate nodes parallel to the growing edge, crossed by fine spiral striae. The nodes are particularly evident on later whorls. A spiral angulation, which is cordlike in earlier whorls, forms the whorl periphery and is traversed by undeflected lines of growth. The thickness and structure of the shell are not known.

Material. – This species is based on four specimens. The holotype, PMO 53621, preserves most of the upper surface in fine condition even though its shape has been modified by lateral pressure, a small break, and a lesser degree of compression. Growth lines are generally missing from the lower part of the outer whorl face. The base is poorly preserved; crushing and slickensides along the edges of the umbilicus effectively prevent any preparation of the umbilical walls. One figured paratype (PMO 53622) (Fig. 1 A, B) has the shape of the upper surface better preserved, but the body whorl is obscured by slickensides. The umbilicus and lower part of the shell are less well preserved, again affected by slickensiding of the dark shale matrix.

The two other paratypes are far less well preserved. The largest, PMO 42183 (Fig. 1 G), is about 50 mm across. The lower part is covered by a

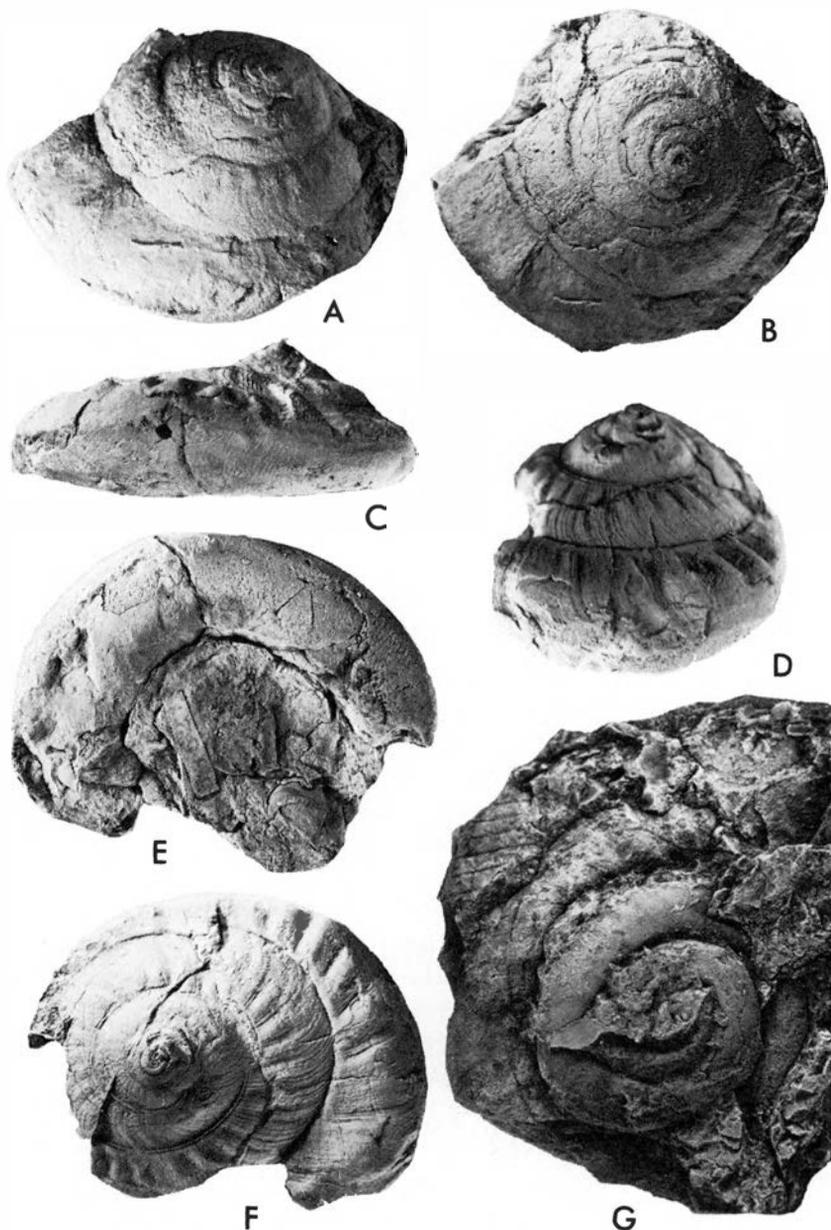


Fig. 1. *Kiaeromphalus kristianiensis*, nov. gen., nov. sp. [All figures natural size and coated with ammonium chloride before photographing.]

- A. Oblique top view of paratype from stage 7a. PMO 53622.
- B. Top view of same specimen.
- C. Side view of holotype from stage 7b β ; note the abnormal flattening and compression of the specimen. PMO 53621.
- D. Slightly oblique side view of the same specimen, showing course of growth lines along side.
- E. Basal view of same specimen.
- F. Top view of same specimen.
- G. Top view of largest paratype, a steinkern, from stage 7a α , showing nodes on the two most mature whorls; pseudo-growth lines seen in the upper left are actually the impression of a trilobite pygidium. PMO 42813.

shaly limestone matrix, and the upper surface is exfoliated. The other paratype, PMO 43165, is slightly smaller, being about 40 mm in maximum width, and is similarly preserved, except that part of the profile of the steinkern is shown. Neither has been compressed, and both show the profile reasonably well. In spite of being exfoliated, both show elongate nodes on the upper surface of the large body whorl and penultimate whorl, so that assignment to the type lot is without question, although their preservation is inferior.

Stratigraphic position and geographic occurrence. – The holotype (PMO 53621) was collected by W. Werenskiöld in 1907 from the unit 7b β at ‘the old quarry west of Løkkeås, Sandvika.’

One paratype also occurs at Sandvika, where it was collected by W. Werenskiöld in 1902. It was obtained from the substage 7a, ‘from the northern limestone quarry of Brambani at the river bend;’ this is now probably the Franzefoss quarry (F. Bockelie pers. comm.). The holotype and paratype from Sandvika show slight differences in the color of matrix in the umbilicus; this, combined with differences in preservation, reinforces the notion that the two fossils could be from different units. Neither is associated with other fossils. Because there was active fieldwork by Kiær between 1902 and 1907 and a change in the position of the 7a–7b boundary, it is theoretically possible that both specimens come from 7b. Likewise, it is possible that both were collected by the same person in either 1902 or 1907 and that there was a subsequent misinterpretation in writing museum labels.

Another paratype was collected by Kiær in 1906 on the south side of Malmøya. It is catalogued as stage 7a, but the associated label gives ‘7a–b (7a1–7a2).’ Along with this specimen is a *Boiotremus longitudinalis* (Lindström, 1884), a *?Prosoptychus sphaera* (Lindström, 1884), and an indeterminate gastropod. D. Worsley suggests (pers. comm.) that this is most likely from 7a. The numbers following a letter were not used by Kiær (1908), and we are unable to determine what subdivisions they refer to.

The largest paratype (PMO 42813), a steinkern about 50 mm across, the basal part covered by matrix, was collected by Kiær in 1904, from stage 7a3. He obtained it ‘in the uppermost exposure of the *Pentamerus*-bearing limestone on the westernmost point on the north coast of Olvøya’ (Bunnefjorden) [translated from label]. It is associated with an indeterminate pleurotomariacean and an indeterminate, high-spired gastropod.

An additional specimen (PMO 54964) of interest came from the south part of the northeast side of the island of Bjørkøya, collected by Kiær in 1906, from the uppermost part of 7a in the ‘*borealis* limestone.’ It is a steinkern and too poorly preserved to be assigned to the species. This possible occurrence should be reinvestigated, although it does not modify the stratigraphic range; if confirmed, it would slightly expand the geographic range to Holmestrand, about 45 km south-southwest of Oslo.

Discussion. – *Kiaeromphalus kristianiensis* closely resembles *Stenorolon? aequilatera* (Wahlenberg, 1818), from the Silurian of Gotland and Britain, in terms of coiling, whorl profile, and shape of the growth lines on the upper whorl surface. However, the Gotland specimens, as illustrated by Lindström (1884, pl. 9, figs. 20–29) lack the subsutural radiating nodes characteristic of *K. kristianiensis* and possess a true slit which generates a selenizone at midwhorl. A selenizone is not present in *K. kristianiensis*, although the strongly prosocline growth ornamentation on the upper whorl surface and the peripheral angulation combine to suggest falsely the presence of an emargination.

Straparollus (Straparollus) paveyi Foerste, 1923, from the Upper Silurian of Ohio, has more rounded whorls and greater sutural indentation than *K. kristianiensis*. In keeping with other species of *S. (Straparollus)*, Foerste's species also lacks the subsutural nodes and peripheral angulation characteristic of *Kiaeromphalus*.

Superfamily LOXONEMATACEA Koken, 1889
Family LOXONEMATIDAE Koken, 1889

Genus *Kjerulfonema* nov. gen.

Type species. – *Murchisonia quinquecincta* Kjerulf, 1865.

Diagnosis. – Shallowly sinuate loxonematacean with ornament of numerous closely spaced, acute, transverse lirae crossed by spiral cords, the latter more closely spaced and prominent on the lower half of the whorl.

Discussion. – The shallow emargination of *Kjerulfonema* is clearly loxonematiform, its greatest depth high on the whorl, rather than murchisoniiform, in giving rise to a slit near midwhorl. *Girvania* Longstaff, 1924, from the Upper Ordovician of Scotland, lacks the acute, somewhat lamellose, transverse lirae characteristic of *Kjerulfonema*, but may also develop transverse undulations. Spiral elements are present in the ornament of both genera but are more numerous and less conspicuous in *Girvania*. In *Spiroecus* Longstaff, 1924, also from the Ordovician of Scotland, a single prominent cord at midwhorl produces a strongly angular profile unlike that observed in *Kjerulfonema*. Neither of Longstaff's (1924) genera are well known, but *Girvania* probably will prove to be more closely related to *Kjerulfonema*.

A number of murchisoniacean genera occurring throughout the Paleozoic superficially resemble *Kjerulfonema* in possessing prominent spiral cords. However, all are readily distinguished from the latter by the presence of a slit generating a selenizone near midwhorl.

Kjerulfonema quinquecincta (Kjerulf, 1865)

Fig. 2.

Murchisonia quinquecincta Kjerulf, 1865: 24, fig. 37a, A.

Description. – A high-spired anomphalous gastropod, ornamented by closely spaced, acute, transverse lirae, crossed by prominent spiral cords which become more numerous and closely spaced on the lower part of whorl. The protoconch and early whorls are not known. Immediately below the preceding suture, the outer whorl surface of later whorls is shallowly concave, adpressed, but soon becomes shallowly convex adaperturally, with maximum whorl width just below midheight of the exposed outer whorl surface. The base is shallowly convex, sometimes with a slightly angular transition to the outer whorl surface. Sutural indentation is slight but, in detail, a combination of spiral cords and the upper convex edge of the adpressed following whorl may produce a narrow channel. The rate of whorl translation is variable, producing subhorizontal to strongly inclined sutures. The aperture is tear shaped, height greater than width; the columellar lip is thickened. A broad, shallow sinus of variable but slight depth in the outer lip culminates above midheight of the exposed whorl surface. Ornament consists of abundant transverse lirae, somewhat lamellose, closely spaced with interspaces about twice the width of lirae, crossed by more widely spaced spiral cords. The transverse lirae occasionally bifurcate near culmination of the sinus, at which point prosocline lirae, characteristic of the subsutural area, become slightly opisthocline or orthocline before developing a shallowly prosoclyt curvature with passage across the base to the columella. The spiral cords become more closely spaced and prominent towards the base. Characteristically, five spiral elements are developed on the exposed whorl surface, the second most adapical cord commonly forming the periphery. An additional faint subsutural cord may be present. The more closely spaced cords of the lower part of the outer whorl face continue onto the base, where spaces between successive cords are generally slightly wider than the cords. The shell is of moderate thickness; its structure is unknown.

Material. – There is some question as to the type specimen for this species. Kjerulf (1865) illustrated the species by a line drawing of an entire shell (fig. 37a), marked as being natural size, and an enlargement of a single whorl (fig. 37A). In the type collection, PMO 42586a (Fig. 2E) is the only specimen preserved. The enlarged drawing does not accurately portray the course of the growth lines, or even the spacing of spiral lirae. The slope of the sutures is slight, whereas the rather greater rate of whorl translation in PMO 42586a has resulted in more steeply inclined sutures. Nevertheless, the specimen may have served as the basis for Kjerulf's fig. 37A, and could be a figured paralectotype.

Within the general collection, one specimen, PMO 42583 (Fig. 2F), not



A



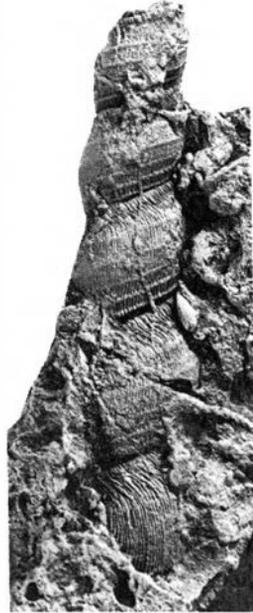
B



C



D



E



F



G



H

labelled as a type, may be compared fairly closely with Kjerulf's fig. 37a, It is almost exactly half the size of the drawing. The specimen preserves five full whorls, with the spire broken off, and the spire is obviously restored in the drawing. Finally, it shows the aperture with a break across the lower part. The match is so close to the drawing that we consider it appropriate to designate this specimen as lectotype, in spite of the size discrepancy.

Three other specimens are in the same box with PMO 42583, namely PMO 42582, PMO 42584, and PMO 42585. According to the museum catalogue, seven specimens of this species, PMO 42580–42586, were collected by Kjerulf. PMO 42580 (Fig. 2 G) is the only specimen in one museum tray, and associated with it is a pencil sketch of a drawing and a label signed by Kjerulf. With the exception of the lectotype, noted above, all the specimens are here accorded the status of paralectotypes, for the information as to locality and collector indicates that they are all part of the type lot. They are all reported from stage 7 at Malmøya on the museum labels.

Stratigraphic position and geographic occurrence. – Kjerulf (1865, p. 24), in listing the name *Murchisonia quinquecineta*, indicated this species as occurring in stages 6 and 7 undifferentiated. The types from Malmøya provide no detailed stratigraphic information. However, his stage 6 is now equated with stages 7a and 7b, and the specimens have a lithology characteristic of those stages (D. Worsley pers. comm.). One nearly exfoliated specimen (PMO 43307) and one fragment (PMO 43308) (Fig. 2 B) were collected along with an indeterminate rotelliform gastropod by Kiær from 7a3 in 1905, 'from the most easterly point of northwest Malmøya on the south side of Skinnerbukta.' In addition, two steinkerns, PMO 42557 and 42558, were collected by Kiær from 'Skinnerbukta, Malmøya,' but these add nothing to the concept of the species.

Two specimens were obtained by Kiær in 1904 from the north side of Ulvøya. One (PMO 42836) is labelled as from unit 7a3, although the museum catalogue simply lists stage 7a. The second (PMO 42779) is labelled as being from 7a2–3, but the museum catalogue lists it as 7bβ;

Fig. 2. *Kjerulfonema quinquecineta* (Kjerulf). [All specimens coated with ammonium chloride before photographing.]

- A. Hypotype from stage 7a3, showing growth lines crossing spiral ornament; × 3. PMO 43308.
- B. Lectoparatype from stage 7; × 3. PMO 42585.
- C. Side view of hypotype from stage 6; × 3. PMO 54569.
- D. Lectoparatype from stage 7, showing the elaborate ornament on base and absence of an umbilicus; × 3. PMO 42582.
- E. Lectoparatype from stage 7, a more attenuated specimen than the other types; × 2. PMO 42586a.
- F. Lectotype from stage 7, presumably the original of Kjerulf's fig. 37a; × 4. PMO 42583.
- G. Lectoparatype from stage 7; × 2. PMO 42580.
- H. Lectoparatype shown in E, rotated approximately 90°.

this specimen is associated with several low-spired gastropods, which are not diagnostic as to age.

In his masterly summary of the Silurian of the Oslo Region, Kiær (1908, p. 592) recorded this species as being limited to stage 7b. Presumably there was some slight adjustment of the assignment of ages to localities, which may not have been modified on the original labels. However, an additional specimen was collected by Kiær in 1902 from the southern point of Bjørkøya. This slab (PMO 54569) (Fig. 2C) is labelled as being from the upper 6 m of stage 6. Associated brachiopods have been identified by D. Worsley as coming from unit 6cβ. We presume that during the compilation of lists this specimen was overlooked.

A single specimen, PMO 52448, has been reported from stage 6 at Spirebukta, Asker, and the associated label indicates that this was recovered from a possibly mixed collection, which included specimens from 5a. The shallow sutural indentation and nearly orthocline transverse lirae may suggest referral to another species. However, with due regard for the confusion concerning locality and stratigraphic derivation, we prefer to omit the specimen from the present discussion.

The species in the Oslo Region ranges from late in the early Llandoveryan to about midway in the late Llandoveryan. It is not known outside of islands containing Silurian rocks in Bunnefjorden, except for the slightly older specimen from Bjørkøya in the Holmestrand area. Bjørkøya is in the same general facies belt as Malmøya (D. Worsley pers. comm.).

Discussion. – This species is difficult to characterize because of the high degree of variation shown. One specimen is particularly attenuated so that sutures are more inclined than normal. Others vary in the degree of impression of the suture.

Perhaps the most disturbing feature of variation has to do with the number of cords on the whorl that provides the specific name. Commonly, only three of the cords are obvious, the fourth being lower and the fifth weak to obscure. The spacing of these cords also varies.

One other described species seems assignable to *Kjerulfonema*. *Turritella cancellata* Sowerby in Murchison, 1839, from the Llandoveryan of England, has for many years been referred to *Holopella* M'Coy, 1851. Pitcher (1939: 110–113) redescribed and refigured the species, questionably assigning it to that genus. Sowerby's species is closely related to the Norwegian species but differs in being a slightly wider shell and in having four prominent spiral cords on the outer whorl face. The type species of *Holopella* itself is a steinkern (Knight 1941, pl. 48) which shows no evidence of spiral cords. We have not examined all species which have been assigned to *Holopella*; perhaps some of them might be transferred to *Kjerulfonema*.

A few specimens in the Teller Collection, U.S. National Museum of Natural History, preserved as external molds in Niagaran dolomites from Racine, Wisconsin, may possibly also be referred to *Kjerulfonema*. An ad-

ditional similarly preserved specimen from Thornton Reef, Illinois, is in the Field Museum of Natural History, Chicago (University of Chicago 28793). However, the relationship of these undescribed, stratigraphically younger, specimens to *Kjerulfonema quinquecineta* is not clear, and further discussion is not warranted at this time.

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April 1975

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