

RW 00000298

# NOVA HEDWIGIA

ZEITSCHRIFT FÜR KRYPTOGAMENKUNDE

HERAUSGEGEBEN VON

J. GERLOFF, F. MATTICK & J. POELT

(BERLIN-DAHLEM)

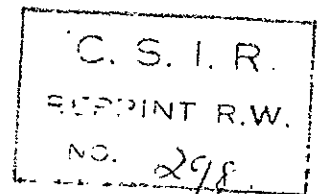
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BAND XIII

New and Interesting Cyanophytes  
from the Kowie River System  
in the Eastern Cape Province (South Africa). II.

by

C. G. M. ARCHIBALD



3301 LEHRE

VERLAG VON J. CRAMER

1967

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KW 111 - the upper region  
in the Hamilton  
Street in Graham

KW 112 - miscellaneous po  
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ACKN

I wish to acknowledge my  
National Institute for Water  
fessor E. S. TWYMAN of Rhod  
dation in his department.

<sup>1</sup>) Council for Scientific and  
Water Research, Pretoria, Sou

B  
der Kryptogamenkunde

New and Interesting Cyanophytes from the Kowie River  
System in the Eastern Cape Province  
(South Africa). II.

By C. G. M. ARCHIBALD<sup>1)</sup>

*With plate 102 (1)*

Introduction

The material investigated in this study was collected during May, 1966, from the following three localities in the Albany district of the eastern Cape Province:

KW 110 – below the bridge crossing the Fern Kloof River (a tributary of the Kowie River) at the bottom of Woest Hill, some 10 km. south of Grahamstown (9. 5. 1966),

KW 111 – the upper region of the Kowie Ditch Stream which arises in the Hamilton Reservoir and runs parallel with South Street in Grahamstown (17. 5. 1966), and

KW 112 – miscellaneous pools and pots in the Botany Department gardens at Rhodes University, Grahamstown (25. 5. 1966).

ACKNOWLEDGEMENTS

I wish to acknowledge my indebtedness to Dr. B. J. CHOLNOKY of the National Institute for Water Research, who directed this work and Professor E. S. TWYMAN of Rhodes University for kindly providing accommodation in his department.

<sup>1)</sup> Council for Scientific and Industrial Research, National Institute for Water Research, Pretoria, South Africa.

## Nostocaceae

*ANABAENA* BORY 1822 ex BORNET et FLAHAULT*Anabaena subvariabilis* n. sp.

This species resembles *Anabaena variabilis* KÜTZING 1843 ex BORNET et FLAHAULT (cf. FRÉMY, 1929: 360, Fig. 294; DESIKACHARY, 1959: 410, Pl. 71, Fig. 5). It differs from it, however, in that the trichomes are markedly constricted, in that the end cell is not conical but broadly rounded and in that its dimensions are somewhat different.

The thallus is not gelatinous but is diffuse and pale grey-green in colour. The trichomes are without a sheath and are straight or curved, often closely entangled and rarely coiled. The dull blue-green trichomes are markedly constricted at the cross-walls and are 4–5  $\mu$  broad.

The vegetative cells are fairly uniform in appearance being most commonly barrel-shaped and distinctly longer than they are broad. In some cases (apparently immediately after division) the cells appear to be subspherical in shape and thus may be slightly broader than they are long. The cells are 5–6  $\mu$  long.

The intercalary heterocysts vary slightly in shape and are most often spherical or more rarely almost oval. Generally the heterocysts are 6  $\mu$  broad and 6–7  $\mu$  long but in some cases they may be up to 8  $\mu$  broad and 9  $\mu$  long. The protoplasmic contents are pale green and homogeneous. The large intercalary akinetes may occur in a series of 5 or 6 in a row but these are always remote from the heterocyst. The barrel-shaped akinetes have flattened ends, a smooth episporium and are 6–8  $\mu$  broad and 12–15  $\mu$  long, with granular contents.

Figs. 1, 2, 3 – Sample: KW 112.

Thallus diffusus, non gelatinosus, pallide viridescens. Trichomata sine vagina, directa sive arcuato-flexa, saepe coacta, raro contorta, apud membranas transversales constricta, 4–5  $\mu$  lata. Cellulae vegetativae uniformiter doliiformes, longiores quam latae. Cellulae post divisionem sphaericae et nonnumquam latiores quam longae. Longitudo cellularum circiter 5–6  $\mu$ . Heterocystae intercalares formae variabilis, sphaericae sive raro ellipsoideae, 6  $\mu$  latae, 6–7  $\mu$ , in occasionibus singulis usque ad 3 sive 9  $\mu$  longae, protoplasmato viride et homoganeo. Akinetae magnae quini sive seni in seriebus intercalatis, sed heterocystis distantibus, doliiformes, polis obtusis, episporio glabro, 6–8  $\mu$  latae, 12–15  $\mu$  longae, protoplasmato granulato.

Habitat: in piscinis instituti botanici Universitatis Rhodes in oppido Grahamstown provinciae Capensis in Africa Meridionale.

Typus: no. KW 112 in collectione C.S.I.R., Pretoria.

Iconotypus: figurae nostrae no. 1–3.

*NOSTOC* VAUCHER 1803*Nostoc undulatum* n. sp.

This species does not appear to be very closely related to any other known species but the diagnosis is similar in some respects to that of *Nostoc hatei* DIXIT 1936 (cf. DESIKACHARY, 1959: 389, Pl. 67, Fig. 2).

The thallus is generally spherical but sometimes may be oval in shape, and possesses a distinct thick limiting outer sheath. The sheath itself is differentiated into a thick inner yellowish layer and two to three thin outer hyaline layers. The mature thallus is approximately 250–350  $\mu$  in diameter, free-floating and has a smooth surface.

The trichomes are coiled and entangled but clearly visible in the gelatinous matrix. The individual trichomes are generally undulating and variable in length but always 3–4  $\mu$  broad. The vegetative cells are subspherical or almost barrel-shaped and are 3–4  $\mu$  long, with prominent granules scattered in the otherwise homogeneous protoplasm. The heterocysts are both intercalary and terminal and are always spherical. The terminal heterocyst is always single while the intercalary heterocysts may be single or occur in a series of up to three but more commonly only two together. The heterocysts are 5  $\mu$  broad, 5–6  $\mu$  long and have a homogeneous protoplasm.

Akinetes were not observed.

Figs. 9, 10, 11 – Sample: KW 112.

Thallus sphaericus sive ex longo rotundus, corio externo distincto. Corium ex strato uno interno flavescens et stratis externis duobus sive tribus subtilibus, sine colore, compositum est. Thalli evoluti 250–330  $\mu$  in diametro, natantes sive scute suspensi, superficie glabro. Trichomata interflexa, sed distincta in mucilaginis thallorum, irregulariterque undulata, longitudine variabile, latitudine 3–4  $\mu$ , granulis distinctis in protoplasmato ceterum homogeneo dispersis. Heterocystae sive intercalatae, sive terminales. Terminales solitariae, sed intercalatae non semper singulae, sed nonnumquam bini et raro terni, 5  $\mu$  latae, 5–6  $\mu$  longae, protoplasmato homogeneo.

Habitat: in piscinis instituti botanici Universitatis Rhodes in oppido Grahamstown provinciae Capensis in Africa Meridionale.

Typus: no. KW 112 in collectione C.S.I.R., Pretoria.

Iconotypus: figurae nostrae no. 9–11.

## Oscillatoriaceae

LYNGBYA AGARDH 1824

*Lyngbya spiraloïdes* n. sp.

This species resembles *Lyngbya laxespiralis* SKUJA (1949: 53, Pl. 10, Figs. 10, 11). It differs from this species in the nature of the vegetative cells and in its dimensions.

The filaments are free, single, unattached and mixed with other algae and are commonly undulate forming loose spirals. The distance between each spiral is 60–70  $\mu$ . The sheath is hayline, fairly thick (about 1  $\mu$ ), smooth, firm and not lamellated.

The trichome is pale blue-green, 5  $\mu$  broad, not attenuated, non-capitate and distinctly constricted at the cross-walls. The vegetative cells are quadrate, and 5–6  $\mu$  long. The end cell is characteristically broadly rounded and without a calyptra.

Fig. 8 – Sample: KW 111.

Filamenta solitaria, non ad substratum unum fixa, in caespitibus algarum intermixta, plerumque flexos irregulares laxosque formantia. Altitudo flexus uni 60–70  $\mu$ . Vaginae mucilagineae hyalinae, modice crassae, glabrae, firmae, non lamellatae. Trichomata pallide coeruleo-viridia, 5  $\mu$  lata, ad apices versus non attenuata, neque capitata, ad membranas transversales distincte constricta. Cellulae vegetativae quadratae, 5–6  $\mu$  longae, cellulae terminales late regulariterque rotundatae, calyptrae carentes.

Habitat: rivulo Kowie Ditch ex lacu artificiali Hamilton Dam dicto profluens in oppido Grahamstown provinciae Capensis in Africa Meridionale.

Typus: no. KW 111 in collectione C.S.I.R., Pretoria.

Iconotypus: figura nostra no. 8.

## OSCILLATORIA VAUCHER 1803

*Oscillatoria decolorata* G. S. WEST 1899 (cf. DESIKACHARY, 1959: 221)

The trichomes are single, unattached, blue-green and 11–11.5  $\mu$  broad. They are not attenuated, non-capitate and non-calyptrate and are not constricted at the cross-walls. The cross-walls are very distinct and clear but not granulated. The protoplasm is homogeneous with a slight differentiation between the chromatoplasm and centropiasm. The cells are shorter than broad being only 4–5  $\mu$  in length, while the end cell is broadly rounded and almost hemispherical in some cases.

GEITLER (1932: 958) has suggested that this species might be identical with *Oscillatoria Borneti* ZUKAL 1894, but this differs from *Oscillatoria decolorata* G. S. WEST 1899 in that the trichomes are very much broader, the cells are much longer and the cross-walls are frequently granulated. It therefore seems advisable to consider these to be separate species.

This species has previously been recorded from Cambridgeshire, England and from a pond at Bai-ka-Bag, Allahabad, India.

Figs. 12, 13 – Sample: KW 110.

*Oscillatoria jasorvensis* VOUK. 1919 (cf. GEITLER, 1932: 962, Fig. 613)

The trichome is straight, slender and bent only at the apex. Typically, the trichomes are non-capitate, non-calyptate and are not constricted at the cross-walls. The ends of the trichomes are rounded and slightly narrower than the middle portion of the filament. The cells are generally almost as long as broad;  $4\mu$  broad and  $3-4\mu$  long. The end cell is rounded and without a calyptra. This species closely resembles that described by GEITLER, and has previously been recorded from Rangoon in Burma and from Bombay in India.

Figs. 14, 15 – Sample: KW 110.

*Oscillatoria proteus* SKUJA (1949: 48, Pl. 8, Figs. 11-13)

The trichomes are straight, most often bent or curved only at the apices, which are gradually attenuate. The trichomes are non-capitate, non-calyptate and  $6-7\mu$  broad. Typically they are markedly constricted at the cross-walls and in most cases the dissepiments are clearly visible.

The cells are almost barrel-shaped, one-third to a half as long as broad,  $2-4\mu$  long. The contents are pale blue-green in colour. The end cell is almost hemispherical and is broadly rounded in most cases.

This species has previously been recorded from Rangoon and Kamayut in Burma.

#### Rivulariaceae

*CALOTHRIX* AGARDH 1824

*Calothrix submarchica* n. sp.

This species resembles *Calothrix marchica* var. *crassa* C. B. RAO 1937 (cf. DESIKACHARY, 1959: 543, Pl. 113, Fig. 3, 4).

The filaments occur in groups but are often found single, unattached and unbranched and are generally curved from the base to the apex. The filaments are between 250 and 350  $\mu$  in length and have a very thin, firm, helical sheath. The trichomes are constricted at the cross-walls and are smoothly attenuated towards the apex, but there is no terminal hair. The cells of the trichome are variable in size but are always broader than they are long. Towards the apex the cells are more uniform in size and are distinctly rectangular in shape. The apical cells are 4.5–5.0  $\mu$  broad and 2.2–2.5  $\mu$  long; the median cells are 7  $\mu$  broad and 6  $\mu$  long; and the basal cells are 8–10  $\mu$  broad and 5–6  $\mu$  long.

The apical cell is distinctly conical and is in some cases acutely so. The large basal heterocyst is single, subspherical to spherical in shape and 7.5–8.0  $\mu$  broad and 6  $\mu$  long.

No akinetes were observed.

Figs. 4, 5, 6, 7 – Sample: KW 112.

Filamenta solitaria, sive in caespitibus parvis conglomerata, non affixa neque ramosa, saepe curvata, 250–350  $\mu$  longa, vagina mucilaginea firma sed tenuis. Trichomata ad membranas transversales constricta, ad apicem versus gradatim attenuata sed sine pilo terminale. Cellulae filamenti magnitudine variabile, sed semper latiores quam longae. Ad apices versus cellulae fere uniformes, rectangularesque, 4,5–5  $\mu$  latae, 2,2–2,5  $\mu$  longae, in partibus medianis filamenti 7  $\mu$  latae, 6  $\mu$  longaeque, et basales 8–10  $\mu$  latae et 5–6  $\mu$  longae. Cellula terminalis conice, nonnumquam acute attenuata. Heterocysta basalis magna, solitaria, subsphaerica sive sphaerica, 7,5–8  $\mu$  lata, 6  $\mu$  longa. Akinetae non observatae.

Habitat: in piscinis instituti botanici Universitatis Rhodes in oppido Grahamstown provinciae Capensis in Africa Meridionale.

Typus: no. KW 112 in collectione C.S.I.R., Pretoria.

Iconotypus: figurae nostrae no. 4–7.

#### SUMMARY

1. Four new species of *Cyanophyta* from the Kowie River system are described and figured. These are *Anabaena subvariabilis*, *Cytothrix submarchica*, *Lyngbya spiraloides* and *Nostoc undulata*.

2. Three known but interesting species of *Oscillatoria* are commented on and illustrated.

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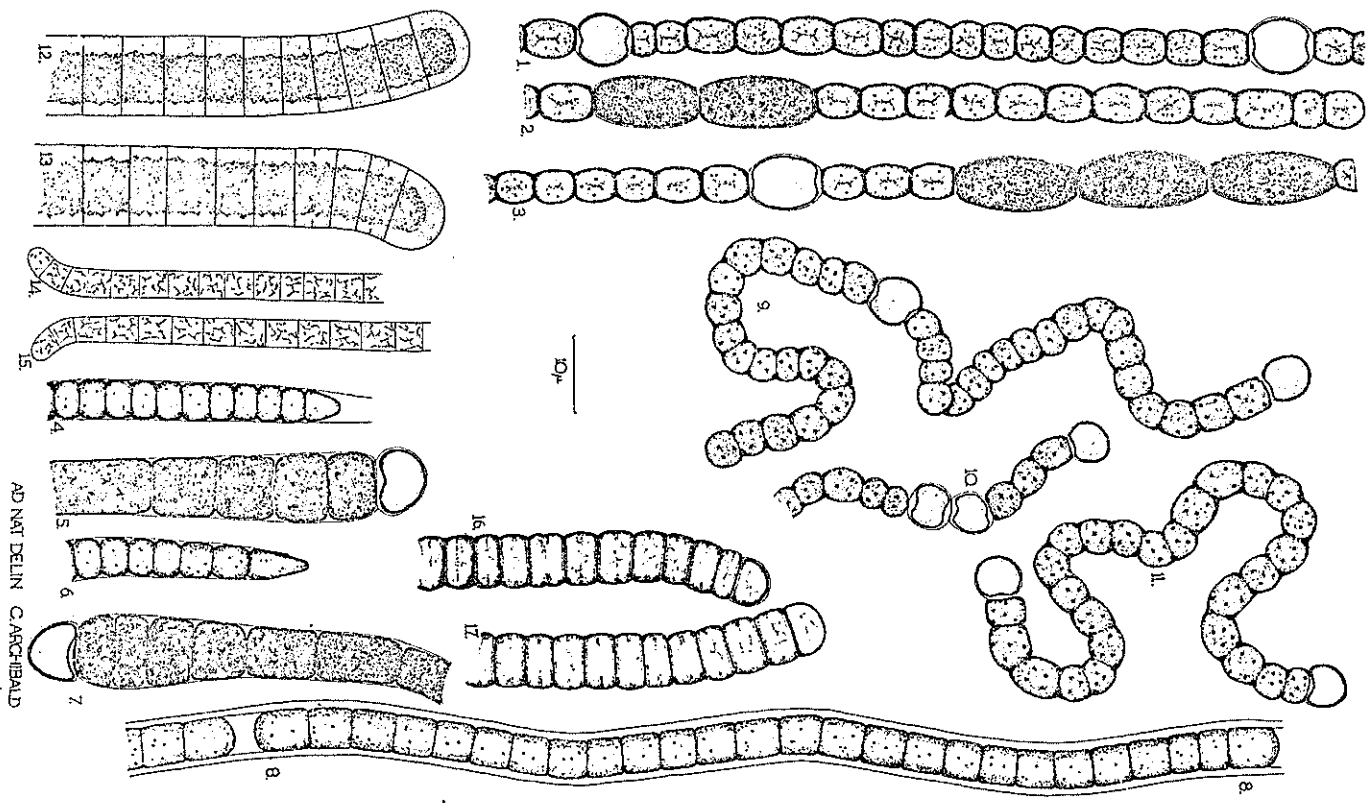
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## EXPLANATION OF PLATE 102 (1)

- 1-3. *Anabaena subvariabilis* n.sp.; 4-7. *Calothrix submarchica* n. sp.;  
8. *Lyngbya spiraloïdes* n. sp.; 9-11. *Nostoc undulata* n. sp.; 12-13. *Oscillatoria decolorata*; 14-15. *Oscillatoria jatorvensis*; 16-17. *Oscillatoria proteus*.



AD NAT DELIN C. ARCHIBALD

## Diatomeenschalen im elektronenmikroskopischen Bild

von Prof. Dr. J. G. HELMCKE (Forschungsgruppe für Mikromorphologie im Fritz-Haber-Institut, Berlin-Dahlem) u. Dr. W. KRIEGER (†). Unter Mitarbeit von Dr. U. GRÜSSLER (Berlin), Dr. J. GERLOFF (Berlin) u. Dr. B. REIMANN (La Jolla, Calif., USA).

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