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## The Distribution of Phytoplankton in Some Central East African Waters

by

J. H. EVANS

(with 8 figs.)



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UITGEVERIJ Dr. W. JUNK DEN HAAG [illegible]

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# The Distribution of Phytoplankton in Some Central East African Waters

by

J. H. EVANS

(with 8 figs.)

From the end of March to the end of September 1960 was spent studying algae while based at the laboratory of the East African Freshwater Fisheries Research Organisation, Jinja, Uganda. Part of the time was devoted to investigating phytoplankton, especially from Lake Victoria and Lake Kyoga, and there follows a brief account of some of this work

## I. PILKINGTON BAY (BUVUMA ISLAND) AND THE BUVUMA CHANNEL, LAKE VICTORIA

The bay is situated at the northern end of Lake Victoria (Fig. 1 and see FISH, 1957 and TALLING, 1957a), opening north into the Buvuma Channel and away from the main body of the lake. The bay is well indented with sub-bays and the edges are, in the main, swampy and shallow.

As far as possible, trips to the bay were made from Jinja in conjunction with members of the research staff of the laboratory on regular, routine visits. Water samples were collected with a Ruttner water sampler at the surface and near the bottom and on some occasions at intermediate levels. Part of each bottom sample was used for determining dissolved oxygen by the WINKLER method and this part of the work was kindly carried out for me by Mr. H Y. ELDER. Counts of planktonic algae, disregarding those of unhealthy appearance, were made by the sedimentation technique of UTERMOHL (1931), LUND (1949) and LUND, KIPLING & LE CREN (1958). The volumes of water sedimented down were varied so that the numbers of units of each species counted fell mainly within the range 50 to 200 for each sample. Species of *Melosira* and all other diatoms,

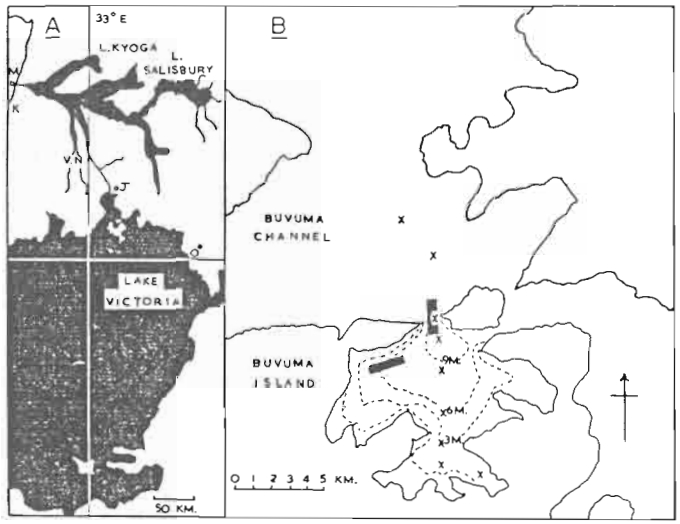


Fig. 1. *A*. The Lakes Victoria and Kyoga and the Victoria Nile (V.N.). Buvuma Island is shown at the northern end of Lake Victoria. J, Jinja; K, River Kafu; M, Masindi Port; V.N., Victoria Nile.
*B*. Pilkington Bay and the Buvuma Channel. The solid black areas are those in which the east-west and north-south lines of samples were taken. The positions marked by crosses are those at which samples were taken on 11th August (Fig. 7).

desmids, *Ankistrodesmus falcatus* (CORDA) RALFS, and species of *Anabaena* were counted as cells, coenobial Chlorococcales as coenobia, *Lyngbya circumcreta* G. S. WEST as coil turns, *L. limnetica* LEMM. as filaments and *Aphanocapsa elachista* W. et G. S. WEST (*Anacystis montana* f. *montana* DR. and DAILY) as colonies per ml. For *Merismopedia* ref. *elegans* A.BR. (*Agmenellum thermale* (KUTZ.) DR. and DAILY) the most convenient units for the purpose of counting, and which made some allowance for the small size of the cells, were found to be groups of eight cells. As a check on the validity of the sampling and counting, duplicate and sometimes triplicate samples were taken from time to time and duplicate counts were made of the most frequent species of algae.

After preliminary samplings in April and early May, series of samples were taken about every fortnight until mid-August. At each of the first four visits to the bay, through May and June, samples were taken along a line about a kilometre long running approximately east to west in the north-west corner of the bay (Fig. 1B). Gill nets were put down along this line, usually before the Ruttner samples were taken, for sample catches of *Tilapia* and other fish. On one of



these visits, samples were taken about every 50 metres while on the others the samples were taken about every 100 metres. Two series of samples were taken, one in July and one in August, along a line about a kilometre long running north to south through the mouth of the bay and in mid-August, in cooperation with Dr. TALLING, a series of samples was taken from the Buvuma Channel through the mouth of the bay and into the shallow inshore regions (Fig. 1B). On this last occasion, oxygen determinations were made by the WINKLER method and temperatures were taken, using a thermistor, by Dr. TALLING.

For all the samples, the counts of *Melosira* ranged between 70% and 99% of the total counted phytoplankton units. The units of phytoplankton, selected largely for convenience of counting, are not strictly comparable in organic mass. The mean cell size of filaments of *Melosira nyassensis* var. *victoriae* O. MULL. in observed sample populations, for example, was of the order of 2000 cubic microns which is about five to ten times the volume of the organic mass represented by each of the units used for the various Cyanophyceae. The numbers of units of Chlorophyceae were consistently low throughout the investigation; *Pediastrum clathratum* (SCHROETER) LEMM., for instance, was represented by 0—10 units (i.e. coenobia) per ml; these forms might have been limited by deficiency of minerals, especially phosphates, nitrates and sulphates (EVANS, 1961 a). It is safe to conclude, therefore, that the genus *Melosira* was, during the period of the investigation at least, the dominant planktonic alga.

It is not easy to distinguish between the different species of *Melosira* unless cleaned frustule preparations are made, but four forms were identified by such preparations, *M. granulata* (EHR.) RALFS, *M. varians* C. A. AGARDH, *M. agassizii* OSTENF. and *M. nyassensis* var. *victoriae* O. MULL. and of these, during my observations, the last was by far the most frequent. This is interesting in view of the observation by Ross (1952) that *M. italica* (EHR.) KÜTZ. was more abundant than *M. nyassensis* var. *victoriae* at inshore stations near Jinja. The only *Melosira* that I could specifically identify as *M. italica* encountered during my six months in East Africa was found in Lake Naivasha. In attempting to deal quantitatively with *Melosira* from Pilkington Bay, however, small filaments of *M. italica* might have been overlooked. For the sake of rapidity of counting, all species of *Melosira* were counted together for most of the samples. The mean numbers of cell per ml of *Melosira* were within the range 350 to 750 for most of the series of samples in the bay and this agrees with the characteristic of 500 cells per ml, given by TALLING (1957a) for mid-April 1956 and does not differ significantly from the results of FISH (1957) for 1950 and 1951.

M. ambigua quite common but not identified

Some of the results for *Melosira* are presented as figures (Fig. 2 to Fig. 7) and results for other algae will be given in the text where relevant to the discussion.

There was a marked increase in mean phytoplankton density in the north-west corner of the bay during May from 400 ± 130 units/2 ml/station (i.e. surface samples plus bottom samples) to 1800 ± 400 units/2 ml/station at the end of the month. There were no significant changes during this time in Cyanophyceae or Chlorophyceae, the increase being entirely due to *Melosira* as follows:

| | Mean cells/ml of *Melosira* | |
|---|---|---|
| Date | Surface samples | Bottom samples |
| 6.5.60 | 60 ± 49 | 281 ± 280 |
| 13.5.60 | 715 ± 384 | 360 ± 300 |
| 27.5.60 | 820 ± 265 | 590 ± 198 |

This increase might have been due, then, to a sudden increase in growth of *Melosira*. It is also possible that there was an influx of water from an area richer in *Melosira*. Such a possibility has been suggested by TALLING (1957a) and by FISH (1957) and has been investigated by EVANS (1961b). A further possible contributory factor to, if not the sole cause of, the increase, is that of the disturbance of the bottom sediments by strong wind for prolonged periods. This has been suggested as of importance in the distribution of *Melosira* by LUND (1955) who also showed (LUND 1954) that *M. italica* sub-sp. *subarctica* could remain alive for up to three years in anaerobic conditions. LUND (1955) also pointed out that the effect of wind would be especially noticeable if it occurred during a period when the population was low. Pilkington Bay is a relatively wide and shallow bay and wind would possibly have the same effect here as in the Lake District of England. Mixing of the shallow water of Pilkington Bay by wind has been referred to by FISH (1957) as a reason for the high concentration of *Melosira* and the importance of the resuspension of cells for the distribution of *Melosira* in Lake Victoria has been mentioned by TALLING (1957b).

There were no further significant changes in phytoplankton density with time in the north-west corner of the bay during the period of the investigation. There were, however, great variations in the spatial distribution of phytoplankton for all except one series of the later series of samples taken.

The density of *Melosira* was found to vary greatly from one station to another along the line in the north-west corner of the bay. This was so when samples were taken at 100 metre intervals in mid-May (Fig. 2) and early June (Fig. 3) and at 50 metre intervals in late June (Fig. 4). These observations agree with certain results obtained by the use of a phytoplankton multi-sampler (EVANS, 1961b). The variation in density in the bottom samples in mid-May (Fig. 2) was less irregular than for the later collections and there was a tendency for the six stations at the outer end of the line to have a sparse bottom flora. There was an abrupt change half-way along the line to a more dense bottom flora (Fig. 2).

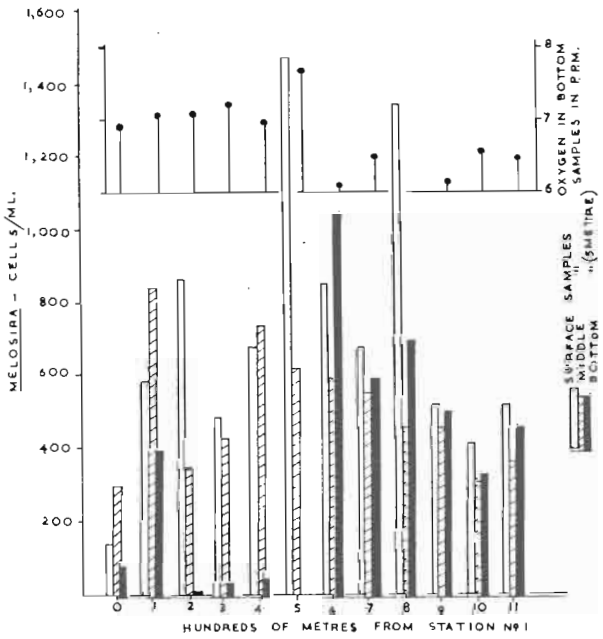


Fig. 2. The variation in density of *Melosira* along an east-west line in the north-west corner of Pilkington Bay at 1700—1800, 13th May 1960. The line followed, approximately, the 6 metre depth contour from Station 1 at the outer, eastern end of the line. The bottom samples were taken at 5 metres depth except at the last two stations, in slightly shallower water, where they were taken at 4 metres. The middle samples were taken at 22 metres depth for all except the last two stations where they were taken at 2 metres.

The concentration of dissolved oxygen in the bottom samples was found in the main to vary inversely with the density of *Melosira* (Figs. 2 and 3) indicating that a depth of about 5 metres is below the euphotic zone and agreeing with the results of TALLING (1957a) for the photosynthetic activity of *Melosira nyassensis* var. *victoriae* in Pilkington Bay.

The marked horizontal variations in the surface and bottom samples might have been in part due to vertical movements of water masses.

It is interesting, however, that stratification of the phytoplankton was found to vary so much even from one station to another at near enough the same time. At station 6 in mid-May, for example (Fig. 2) *Melosira* occurred at over 1,400 cells/ml at the surface, fell to about 600 cells/ml in the middle zone and was absent from near the bottom,

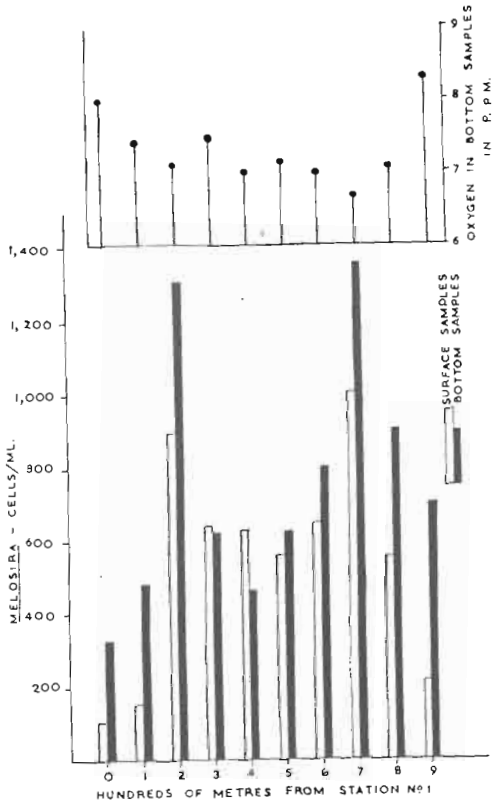


Fig. 3. The variation in density of *Melosira* along an east-west line in the north-west corner of Pilkington Bay at 1700—1800, 9th June 1960. The bottom samples for the first five stations were taken at 5½ metres depth, for the last two stations at 4½ metres depth, and for the intermediate stations at 5 metres depth.

while at the adjacent station of the same depth, vertical mixing had apparently occurred, resulting in a more or less even column of *Melosira* from the surface to near the bottom. Distinct differences in stratification of *Melosira* from one station to another were also found in later series of samples. On 24th June, for example, the sedimentation of filaments that might be expected in calm water occurred



at station 3, while at station 8, 250 metres away, at more or less the same time, *Melosira* was concentrated at the surface. Between the two stations was a region of vertical mixing (Fig. 4).

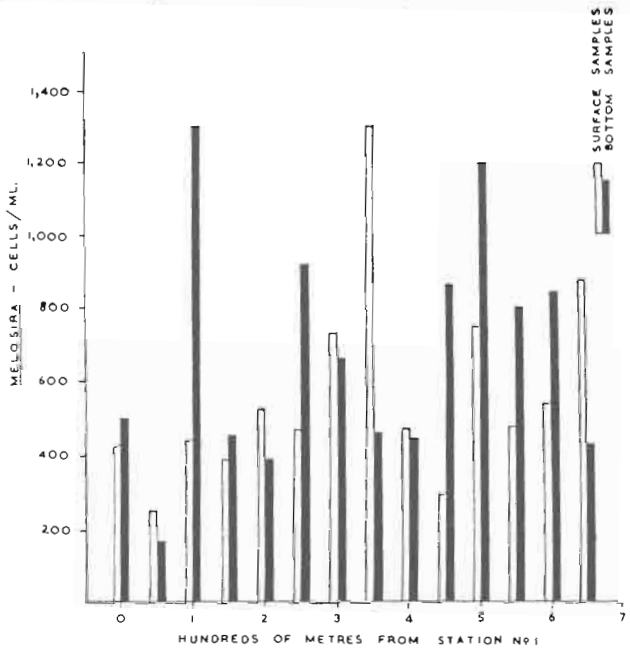


Fig. 4. The variation in density of *Melosira* along an east-west line in the north-west corner of Pilkington Bay at 1700—1800, 24th June 1960. The line followed, approximately, the 6 metre depth contour from Station 1 at the outer, eastern end of the line. The bottom samples, except the first two which were taken at 6 metres depth, were taken at a depth of 5 metres.

That great variations in phytoplankton density occur at the mouth of the bay was observed in late July (Fig. 5) and early August (Fig. 6). On the first occasion there was more or less even vertical distribution, with the exception of one station, inside the bay, while just outside the bay three was a surface concentration of *Melosira* which, it is believed, had either been lifted up vertically, or carried horizontally from inside the bay by the outward movement of water. However, none of the other algae counted showed significant differences in concentration between surface and bottom samples outside the bay so that it seems more likely that the *Melosira* filaments had been carried to the stations outside the bay by horizontal movement of the surface water. This agrees with the suggestion by Fish (1957) that there is exchange of water between the bay and the Buvuma Channel and indicates the occasional, if not frequent, inoculation of these

diatoms into the Channel. Generally, during March to September, there are strong winds from the south, south-east or south-west at the northern end of Lake Victoria from about noon to nightfall There would be a general tendency, then, for surface water currents to be moving out of the bay during the afternoon and there would be a

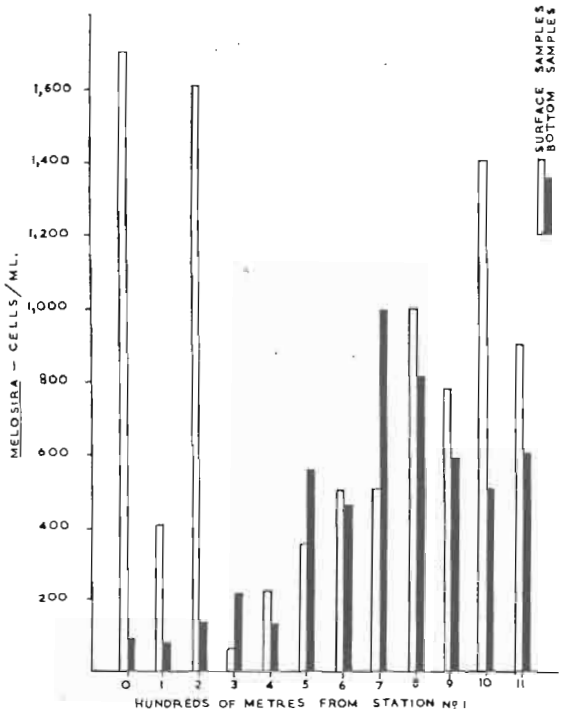


Fig. 5. The variation in density of *Melosira* along a north-south line through the mouth of Pilkington Bay at 1600—1700, 22nd. July 1960. The depths of the bottom samples ranged between 12 metres at the outer, northern end of the line to 9 metres at the southern, inner end.

more or less regular transfer of phytoplankton-rich water to the Buvuma Channel. A return of *Melosira* into the bay was discovered during a brief investigation of the carriage of phytoplankton by surface water currents (EVANS 1961b) It is likely, however, at least during March to September, that the usually prolonged and often strong southerly winds of the afternoon would have a greater effect than the weaker northerly winds so that on balance a greater quantity of phytoplankton, especially *Melosira*, would be transferred out of the bay in surface water than into it. The return of *Melosira* by incoming water currents near the bottom from the Buvuma Channel



to the photic zones of the bay has also been suggested (EVANS, 1961b).

For the samples taken on the 5th August (Fig 6), Cyanophyceae and other algae as well as *Melosira* were represented sparsely in the surface flora at the outer end of the line and had apparently sedimented. For the six stations at the outer end of the line the mean

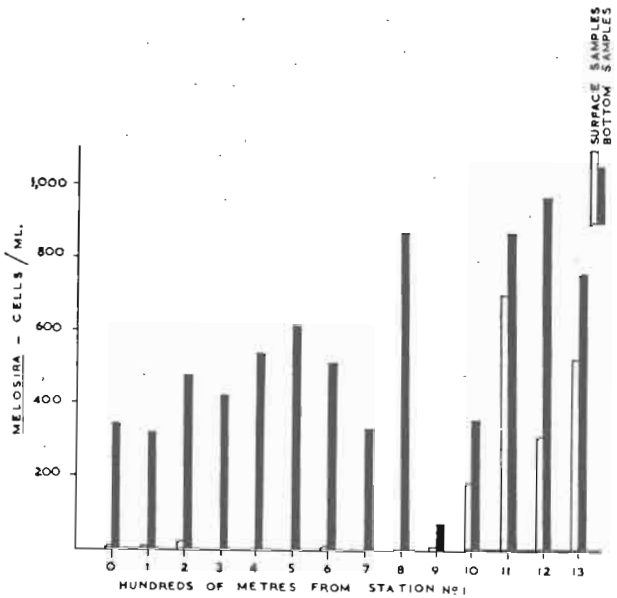


Fig. 6. The variation in density of *Melosira* along a north-south line through the mouth of Pilkington Bay at 1700—1800, 5th August 1960. The depths of the bottom samples ranged between 12 metres at the outer, northern end of the line to 9½ metres at the southern, innner end.

numbers of units of three species of the Cyanophyceae (*Lyngbya circumcreta*, *Aphanocapsa elachista* and *Merismopedia elegans*), for example, in the surface and in the bottom samples were respectively, 26 ± 26 units/ml and 92 ± 18 units/ml (where $p = 0.005$). If the relatively dense concentrations of *Melosira* were simply due to sedimentation of the filaments of this genus it is difficult, if not impossible, to explain how it is that *Aphanocapsa elachista* and possibly the other Cyanophyceae, which one would not expect to behave in the same way (see TALLING, 1957b), showed a similar vertical distribution. Again, it is likely that water currents had a marked effect on the distribution of the phytoplankton and it is believed that the sparse surface flora was due to incoming water currents from the Buvuma Channel. In the early hours of the next morning, surface water was found to be moving from the south-west

out of the bay (see EVANS 1961b, Fig. 3C) and by 0400 hours, the concentration of phytoplankton had increased markedly. *Melosira*, for example, had increased to 500 cells/ml and *Lyngbya circumcreta* to 165 coil turns/ml.

The last series of samples was taken during very calm, smooth conditions and this is reflected in the stratification shown by *Melosira* in the Buvuma Channel and just inside the bay (Fig. 7). Progressively closer inshore the vertical distribution of *Melosira* changed until at station 8 high concentrations of *Melosira* were found, up to about 2,250 cells/ml at the surface. In the „sub-bay", on the other hand, *Melosira* had sedimented. Possibly the high surface concentration in the surface water of the inshore stations was due to slight inshore movement of surface water. The „sub-bay" was less affected by surface drift so that the expected sedimentation of *Melosira* was found. At these inshore stations the phytoplankton cannot sink more than about two metres below the surface and so is retained in the

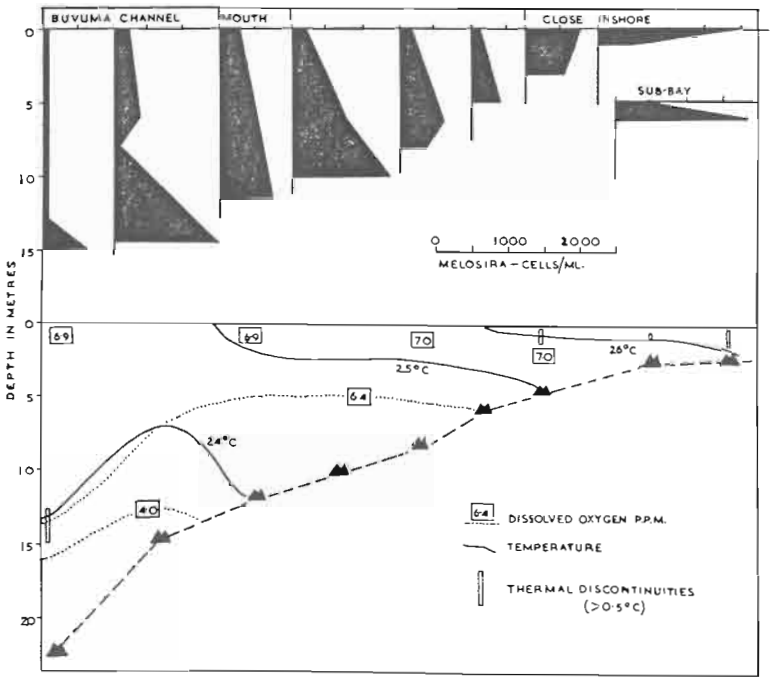


Fig. 7. The variations in temperature (unbroken line), dissolved oxygen in p.p.m. (dotted line), and in density of *Melosira* along a line from the Buvuma Channel, through the mouth of Pilkington Bay to the inshore regions of the Bay at 1015—1300, 11th August 1960. There is no horizontal distance scale as this would have to be distorted for compactness (see Fig. 1 B).



photic zone so that the inshore regions might serve as a more or less permanent source of dense concentrations of *Melosira*.

Though periods of thermal discontinuity may be brief in Pilkington Bay (FISH, 1957) and interrupted by nocturnal mixing (TALLING 1957a), there was distinct stratification of temperature and oxygen on 11th August (Fig. 7) and at three of the inshore stations there were marked thermal discontinuities. This is a reflection of the calm weather conditions prevailing during the sampling, and the pattern of the stratification supports the tentative conclusion that the high surface concentration of *Melosira* at the inshore stations might have been due to slight inshore movements of surface water.

Attempts were made to correlate phytoplankton densities with the catches of phytoplankton-feeding fish (mainly *Tilapia esculenta* GRAHAM and *T. variabilis* BOULENGER) made by the gill nets but so few fish were caught that the results were too sparse to permit any definite conclusions to be reached. There was, however, a slight tendency, for a given mesh-size of gill net, for more fish to be caught where the phytoplankton density was highest.

Surface water samples from Pilkington Bay and the Napoleon Gulf were collected in August 1961 and sent to me by Dr. TALLING. In these samples the density of *Melosira* was low, of the order of 10 cells/ml. Many cells were present, however, which must have been dead or dying at the time of collection. Silica concentration was low (Mrs. TALLING determined $SiO_2$ as 1.6 mg/l for each station) but probably insufficiently low to be limiting. Dr. TALLING has informed me that the weather in July and August was stormy and has suggested that a removal of *Melosira* from these inshore stations might have occurred. As support for this, he observed a sudden increase of *Melosira* in an open lake station in August. Another suggestion by Dr. TALLING is that "less suitable" water introduced to inshore regions from the open lake might have reduced *Melosira*. Clearly, whatever the mechanism involved, water currents on this occasion had a marked effect upon *Melosira*.

Several general conclusions may be reached. In agreement with TALLING (1957b) and FISH (1957), it may be said that Pilkington Bay supports a denser population of phytoplankton than the open water. The distribution of phytoplankton in the bay alone is highly complex and before any complete understanding of the distribution of the phytoplankton within the lake can be reached, further investigations of the effect of water currents and seiche movements are essential.

## II. LAKE KYOGA

Lake Kyoga is a relatively shallow, swampy lake to the north of Lake Victoria (Fig. 1A). The main inflow is from the Victoria Nile and there is a small contribution from the east from Lake Salisbury and some of the streams running off Mount Elgon. The only outflow is the continuation of the Victoria Nile which is joined by the River Kafu south of Masindi Port. After a preliminary trip by Lake Steamer to Masindi Port from Namasagali on the Victoria Nile in May when samples were taken from the western end of the lake, a weekend was spent in mid-August sampling from a lake steamer and from a dinghy to the east of the Victoria Nile inflow. On the return trip from Kelle, a small port on the north side of the lake, a series of surface samples was taken along a line to the point of inflow of Lake Victoria water. Water temperatures, pH by Lovibond comparator method and conductivity measurements, by means of a "Dionic" water purity tester, were taken immediately after sampling. Preliminary observations were also made with a portable microscope for more delicate algae. Near Bugondo, water samples were taken for oxygen determinations by the WINKLER method. A water sample from each station was preserved with Lugol's iodine solution for later algal counts by the sedimentation technique. At five stations sufficient water was collected and preserved with toluene for later chemical analyses all of which, except the sulphate determinations, were kindly carried out for me by Mrs. TALLING. Sulphate was determined by a simple modification of the turbidimetric method described in THRESH, BEALE & SUCKLING (1949).

The fall in conductivity from east to west was probably largely a reflection of the fall in silicate (Fig. 8), but there was also a decrease in sulphate, in nitrate nitrogen from 0.008 mg/l to 0.006 mg/l and phosphate from 0.33 mg/l (as P) to 0.18 mg/l. This increasing dilution was probably partly due to the Victoria Nile inflow and partly, though less so, to the inflow from the south-east arm of Lake Kyoga.

The higher sulphate content of the water at the eastern end of the line might have been in part due to the off-drainage of water from the Kyoga shales, which are sulphide bearing rocks, to the north of the lake. The sulphate content of Lake Kyoga, 1 mile from Bugondo, has been recorded as „not detectable" (ANON., 1953), but as the level below which sulphate is considered to be not detectable was not stated it is difficult to make comparisons though there is reason to believe that the sulphate content in mid-August 1960 was higher than in June 1953. A sulphate level of 21.3 p.p.m. at the surface and 26.6 p.p.m. at 43 metres depth has been recorded for Lake Albert (ANON., 1953) and this lake clearly has an important effect upon the chemistry



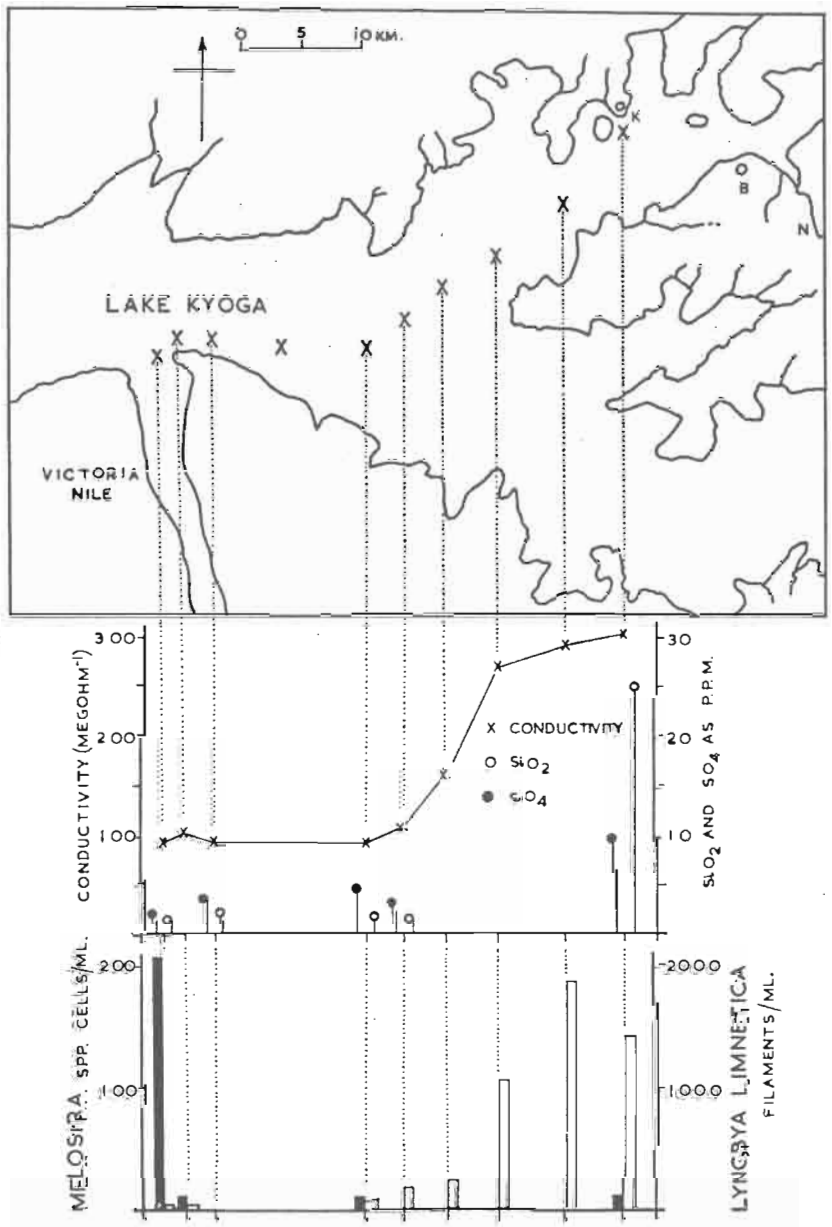


Fig. 8. Part of the north-east arm of Lake Kyoga and the point of inflow of the Victoria Nile. Stations from which samples were taken are shown and, below, results of certain chemical analyses and algal counts. For one station, the 4th from the left on the map, the results were discarded as the sample had been contaminated with debris from a floating island. K, Kelle; B, Bugondo; N, River Nyakomodoyi.

of the Nile water (see TALLING, 1957c). There may also be, at times, an effect upon the main waters of the upper Victoria Nile, which like Lake Victoria are generally low in sulphates, by small contributions from eastern Lake Kyoga.

The relatively high silicate content of the water in the north-east arm of the lake may be in part due to the inflow of water from the south, e.g. River Nyakomodoyi (Fig. 8), which flows through dense papyrus and grass swamp. According to unpublished data of FISH (c. 1950) water flowing through such dense swamp in this area is subject to an increase of silicate from 2 p.p.m. (as $SiO_2$) to 40 p.p.m.

It is interesting that *Melosira* should be represented so sparsely in eastern Lake Kyoga. The relatively high concentration at the most western station was due to the inflow of the Victoria Nile. It has been suggested (EVANS 1961a) that the growth of *Melosira* in Lake Victoria is limited by phosphate deficiency but the concentration of phosphate was higher in eastern Lake Kyoga than in the Victoria Nile. The concentration of silicate, being higher than in the Victoria Nile, might have been sufficiently high at 25 mg/l to be inhibiting growth of *Melosira* although the results of CHU (1942) for other diatoms would suggest otherwise. The relatively high silicate concentration might indeed have been merely a reflection of the relative scarcity of this genus. What is more, high conductivity and high silicate concentration were restricted to the north-east arm of the lake whereas *Melosira* was scarce or absent at all the stations east of the inflow. Result of PROWSE & TALLING (1958) indicated that for *Melosira granulata* in the White Nile a concentration of nitrate nitrogen of 0.02 mg/l might be a critical level. The growth of *Melosira* in north-east Lake Kyoga might, then, have been limited by nitrate deficiency. The probability of algal competition for nutrients, citing the frequent occurrence of an inverse relationship between the densities of *Melosira* and *Anabaena flos-aquae* var. *intermedia* f. *spiroides* WORON. has been mentioned by PROWSE & TALLING (1958). In north-east Lake Kyoga, *Melosira* was possibly failing in competition for nutrients with *Lyngbya limnetica* although the possibility of an inhibitory effect upon *Melosira* by exsudates from *L. limnetica* should not, perhaps, be entirely overlooked.

Other diatoms were recorded in Lake Kyoga including *Cyclotella kutzingiana* THWAITES, *Synedra ulna* (NITSCH) EHR. 1838, *Stauroneis schroederi* HUST. and *Nitzschia palea* (KÜTZ.) W. SMITH but with one exception, *Nitzschia acicularis* W. SMITH, were all very sparsely represented. The Cyanophyceae present, with the exception of *Lyngbya limnetica*, were no more dense than in the Victoria Nile.

Whatever the causes, it is clear that during the very short period of this investigation the contribution made to the Victoria Nile by



eastern Lake Kyoga was very different from that of the waters coming down from Lake Victoria. During these, and the preliminary observations in May, a number of new records of algae were listed for this almost completely uninvestigated lake and a systematic account of these algae is to be published separately. There follows, however, a brief list of species, all of which are, it is believed, new records for Lake Kyoga:

*Botryococcus braunii* KÜTZ.; *Ankistrodesmus falcatus* (CORDA) RALFS; *Dictyosphaerium pulchellum* WOOD; *Tetraëdron trigonum* (NAEG.) HANSG.; *Scenedesmus obliquus* (TURP.) KÜTZ.; *Sorastrum spinulosum* var. *hathoris* (COHN) LEMM.; *Coelastrum reticulatum* (DANG.) SENN; *C. microporum* NAEG.; *Closterium gracile* BREB.; *Staurastrum cuspidatum* BREB.; *Uroglena americana* CALK.; *Melosira granulatum* (EHR.) RALFS; *M. agassizii* OSTENF.; *M. nyassensis* var. *victoriae* O. MÜLL.; *Merismopedia* ref. *elegans* A. BR.; *M. tenuissima* LEMM.; *Microcystis aeruginosa* KÜTZ.; *Anabaena variabilis* KÜTZ.; *A. circinalis* RABEN.; *Anabaenopsis tanganyikae* (G. S. W.) WOL.; *Glenodinium pulvisculus* (EHR.) STEIN.; *Euglena acus* EHR.

## SUMMARY

Observations of the distribution of phytoplankton were made in Pilkington Bay, Lake Victoria and in Lake Kyoga. For Pilkington Bay, series of samples were taken along an east-west line in the north-west corner of the bay and along a north-south line through the mouth of the bay. For Lake Kyoga, the main series of samples was taken from the north-east arm to the point of inflow of the Victoria Nile.

Counts of algae were made by the sedimentation technique and it was found that for Pilkington Bay *Melosira* was the dominant genus during the period of the investigation. For the north-east arm of Lake Kyoga the dominant alga in mid-August was *Lyngbya limnetica*.

At times, marked changes not only in density of phytoplankton but also in vertical distribution were observed from station to station in Pilkington Bay.

During May an increase of *Melosira* occurred in the north-west corner of Pilkington Bay and this increase is as likely to have been due to water movements as to growth.

Water movements have an important effect on phytoplankton distribution and it is possible that surface water movements bring about inoculation of relatively dense concentrations of phytoplankton, especially *Melosira*, into the Buvuma Channel from Pilkington Bay.

The contribution of the north-east arm of Lake Kyoga to the Victoria Nile system was found to be markedly different chemically and biologically from that of Lake Victoria.

A number of new records of algae from Lake Kyoga are listed.

## RÉSUMÉ

Des recherches sur la distribution du phytoplancton furent poursuivies dans la baie de Pilkington, dans le lac Victoria et dans le lac Kyoga. A la baie de Pilkington, des séries d'échantillons furent prélevées sur une ligne allant de l'est à l'ouest et située dans la partie nord-ouest de la baie, ainsi que sur une ligne traversant du nord au sud l'entrée de la baie. Au lac Kyoga, la principale série d'échantillons fut prélevée à partir de sa pointe nord-est jusqu'à l'arrivée des eaux de la branche mère du Nil.

Le dénombrement des algues fut fait selon le procédé de la sédimentation et les résultats de l'enquête indiquent que, dans la baie de Pilkington, *Melosira* était le genre le plus répandu pendant la durée des recherches. Quant à la pointe nord-est du lac Kyoga, l'algue la plus répandue, à la mi-août, était *Lyngbya limnetica*.

A certains moments, des variations marquées, non seulement dans la densité du phytoplancton mais encore dans sa distribution verticale, furent constatées de divers postes d'observation sur la baie de Pilkington.

Pendant le mois de mai, il se produisit une augmentation de la quantité de *Melosira* dans la partie nord-ouest de la baie de Pilkington, augmentation qui semble provenir des mouvements de l'eau ainsi que de la croissance.

Le mouvement de l'eau exerce une influence importante sur la distribution du phytoplancton et il est possible que les mouvements de surface de l'eau produisent l'augmentation dans la canal de Buvuma de concentrations assez denses de phytoplancton, de *Melosira* surtout, provenant de la baie de Pilkington.

L'apport de la pointe nord-est du lac Kyoga au réseau de la branche mère du Nil se révéla de composition chimique et biologique sensiblement differente de celle du lac Victoria.

Un certain nombre d'observations nouvelles des algues du lac Kyoga ont été notées.

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