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MARINE FUNGI FROM ROMANIA

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ABSTRACT

The paper presents 26 species of marine fungi from the Black Sea along the Romanian coast during the month of July 1969. Are included one species of mykomycetes, 9 spp. of Phycomycetes 8 ssp. of Denteromycetes and 9 spp. of Ascomycetés. Have been investigated, the same, brackish water in some arias from the Danube Delta as well as suprasalive. Tekirghiol Lake waters.

The majority of the described species are new for the Romanian Coast and several among them are also new for de Black Sea.

1. INTRODUCTION

Previous mycological investigations in the open water of the Black Sea were made particularly by Kriss and Novozhilova (1954), Kriss (1963) and by Meyers, Ahearn and Roth (1967). The latter authors isolated moulds and yeasts from water samples taken at different depths as well as from the air over cruising ships. The following list of moulds was given by them.

Cladosporium herbarum

C. cladosporioides

Aureobasidium pullulans

Alternaria tenuissima

A. tenuis

Penicillium citrinum

P. casei

P. implicatum

P. oxalicum

P. goldewskii

Asperigillus versicolor

A. niger

Fusarium oxysporum

Cephalosporium sp.

Papularia sphaerosperma

Representatives of 5 genera of the above fungi were also obtained below a depth of 100 m. The same authors also isolated 37 airborne fungi including yeasts; aerial mycora belonged to Alternaria, Cladosporium, Stemphylium and Epicoccum.

On the other hand, little work has previously been made on marine and brackish water fungi of the littoral region in the Black Sea. Thus Kohlmeier (1959) recorded a single Ascomycete, of the wood destroying fungi, namely Halosphaeria mediosetigera Cribb and Cribb from the Black Sea littoral, while Hohnk (1967) made a more detailed study of submerged fungi in the neighbourhood of Constanza, during the months of July and August 1966. He collected water samples from the sea littoral as well as sediment samples in shallow water and baited them with pine pollen, rice and hemp seeds. Hohnk's cultures yielded the following fungi:

On pine pollen:

good growth of Thraustochytriaceae
and moderate or scarce growth of
Chytridiales

On rice and hemp seeds:

mycelia of Oomycetes
mycelia of fungi imperfecti

On shell fractures of snails
and mussels :

Thraustochytriaceae, Oomycetes,
mycelia of fungi imperfecti.

Höhnk also obtained Thraustochytriaceae from sediment samples collected in the supersaline "Tekirghiol" Lake.

The taxa obtained by Höhnk during his study, could be enumerated as follows:

Pythium (mycelium, no sexual organs)	Saprolegnia (no sexual organs)
Oospora lactis	Thraustochytriaceae
Humicola fuscoatra	Alternaria sp.
Helminthosporium sp.	Helicoma maritima
Fusarium sp.	

The present investigation was undertaken during the month of July, 1969 at the Marine Biological Station of Agigea (District Constanza). It entails a preliminary report of the lower and higher fungi encountered along the littoral and infra littoral regions, as well as in certain other brackish water localities in the Delta of the Danube, together with ecological notes on the species observed. The number of marine and brackish water fungi actually found in such localities far exceeds the number given in this report, since many such species were represented only by incomplete stages of their life history and it was not possible to identify them. Attention is also directed to the importance of the Delta of the Danube with its diversified brackish water habitats from which numerous isolates of fungi could be obtained. The few samples obtained during this investigation from the Danube Delta were ecologically of interest and demonstrated the importance of following up the distribution of such organisms in a wider spectrum of salinity. It also appears from this preliminary report that no sharp demarkation exists between marine and brackish water fungi, since many species are able to survive in both habitats. In fact some lower fungi found previously in the Baltic Sea, exist also in the supersaline water of Tekirghiol Lake ($S = \text{ca } 80^{\circ}/\text{oo}$) in Rumania.

The role of marine fungi in the decomposition of organic matter, in destroying cellulose and lignified materials such as wood, ropes and fishing twine submerged in sea water, as well as in checking the numbers

of algal and planktonic populations has been stressed particularly by Bar-ghoorn and Linder (1944), Aleem (1950), Kohlmeyer (1958) and Johnson and Spaceow (1961).

2. MATERIAL AND METHODS

Material for the present investigation was in most cases examined fresh. The substrates examined were obtained in the following habitats (fig. 1).

A - The littoral and infralittoral regions at Agigea, extending along a shoreline of about 2 km between the Sanatorium Beach and the Fishery Pier. This area includes the following biotopes :

a. Phytal substrata: growing in the upper littoral belt down to a depth of ca 10 m. The following algae were particularly examined for saprophytic and parasitic fungi:

Enteromorpha spp.	Bryopsia plumosa
Cladophora spp.	Sphacelaria spp.
Cystoseira barbata	Griffithsia spp.
Antithamnion sp.	Callithamnion corymbosum
Ceramium spp.	Peyssonnelia spp.

Besides, decomposing leaves of seagrasses cast ashore were also examined.

b. Shallow water sediments:

Samples of fine sediments and sediments containing shell fragments from the infra littoral region were brought into the laboratory, kept in a Provasoli culture medium¹ (S=23.9%), baited with pollen^{x)} of flowering plants (Helianthus anus and Verbascum sp.) and incubated at room temperature. Lower fungi in particular appeared in such cultures within a few days.

^{x)} While pine pollen had extensively been used as bait for fungi in cultures, pollens of dicotyledonous plants as used here, also proved as good.

c. Putrified wood :

Samples of submergen wood of various orgin (conifers, poplar, Salix, etc) were examined fresh. Drift wood fragments were also collected and examined. Moreover, wooden panels were kept in running sea water in the aquarium and frequently examined. All such semples revealed infestations with lignicolous fungi in varying degrees.

B. Plankton : A few plankton samples collected at the surface in the Bay of Constanza in July, were also examined for marine fungi. Among these, occasional spores of Alternaria and other fungi were encountered. No true parasitic or saprophytic fungi were so far detected in planktonic organisms from this Bay. This is probably due to the inadequate number of plankton samples examined. The Same is true also of foam samples examined from the littoral region.

C. The Danube Delta: (Oligo - and mesohaline waters): Substrates examined included putrified wood and twigs, together with other phythal substrates collected mainly from the following stations in the Danube Delta :

a. Mesura Bay near Sulina (S = ca 3⁰/oo): substrates: Decomposing grasses of Ruppia and Potamogeton, filamentous algae, floating wood; Spartina, twigs, etc.

b. Meteorological Station I (4 km off Sulina; S = ca 10⁰/oo): substrates examined included wooden pylons and submerged vegetation.

c. Maliuc (near the Reed Experimental Station) : Phragmites and other twigs immersed in water.

d. Lake Razelm: substrates: wood, algal fragments and hydrophytes (S = ca 7⁰/oo).

D. The supersaline Lake Tekirghiol

This characteristic lake with a salinity reaching about 80⁰/oo

was examined along the littoral extending between the resorts of Eforia North and Eforia South. Samples were taken from wooden piers, from algae and submerged twigs, as well as from bottom sediments. The green algae Enteromorpha and Cladophora with the epiphytic diatom Synedra tabulata were very common. Bottom sediments from the above lake were also baited with Verbascum pollen and incubated at room temperature.

3. SOME ENVIRONMENTAL ASPECTS

Detailed considerations of the hydrographic and environmental characteristics of the above habitats were given by Chiriac, Bacescu et al (1966). Only a few remarks pertaining to local variations in temperature and salinity during the time of investigation will be mentioned here. It has been noticed, for example, that changes in temperature and salinity in coastal waters at Agigea vary considerably from day to day in July, depending on wind direction and speed.

Thus fluctuations in surface salinity ranging between 9.7 and 19.2^o/oo were recorded within a few days period off Agigea in this month. Water temperature, likewise, ranged between 11 and 25^oC at the surface. Lower temperatures and salinity are due to influxes of more fresh water from the Danube into the Bay of Constanza by strong winds. During eough weather the water column in the Bay is mixed up, so that no stratification could be detected to a depth of several meters.

The following table (Table 1) shows some such variations in environmental parameters at Agigea.

Sediment transport is also active in this Bay and much fine sediments had earlier been deposited in the coastal region off Agigea due to the construction of a new sea-wall near Constanza. This was responsible for the destruction of large quantities of benthic algae during 1968 in the Agigea littoral (Dr. H. Skolka, personal communication).

Table 1

Temperature and salinity variations at Agigea in July

Date	Wind direction	Air. Temp.	Depth (n)	Water Temp.	Salinity	Secchi Depth (m)
10. 7. 69	North	25°C	0	25°C	9.7‰	1
			10	23°C	-	
			15	22°C	28‰	
14. 7. 69	West	21°C	0	11°C	19.2‰	2
			2	11°C	19.2‰	
15. 7. 69	West	17°C	0	13°C	18.3‰	3
			5	13°C	18.3‰	

The mean temperature in the Danube Delta during the month of July amounts to 22°C

The surface water in the Delta freezes between November and April. The average discharge of the Danube water into the sea amounts to 84 million tons of water annually from the three main branches of the River. The salinity in Mesura Bay near Sulina during the time of sampling was about 3‰, while at the Meteorological Station where the water is more stagnant the salinity amounts to ca 10‰.

4. SYSTEMATIC ACCOUNT OF THE TAXA OBSERVED

MYXOMYCETES

Labyrinthulae1 - Labyrinthula macrocystis Cienkowski

In Johnson and Sparrow, 1961 p. 529

This species (fig. 2, a and b) was found in Bryopsis plumosa, growing under water at Agigea. Fusiform Cells, hyaline, about 15-20 μ long and 4-4 μ broad, dividing initially by transverse septa. Slimeways filamentous, branching anastomosing, produced by spindles or cyst cells.

Opaque sori are formed by spindle aggregation; enclosing pellicle developed.

In addition to this basic description quoted from Johnson and Sparrow, long, thick, greyish, cord-like, branching filaments from which numerous slimeways arise have also been observed.

As pointed out by Johnson and Sparrow, this species seems to be polymorphic and both L. Chattoni and L. Valkanovi may well be related to it. Our specimens also show characters related to these latter species.

The species was originally described by Cienkowski (1867) as infesting marine algae in the Black Sea.

PHYCOMYCETES

Chytridiales

Olpidiaceae

2 - Olpidium maritimum Hohnk et Aleem, 1953, p. 224-229, figs. 1-7.

This species (fig. 3) was obtained in sediments from the Agigea littoral, baited with pollen of Verbascum. The fungus grew well on pollen, forming one or more thalli which develop into spherical or obovoid zoosporangia, 15-25 μ in diameter, each possessing one discharge tube, ca 10 - 12 μ long and 4 - 5 μ in diameter. Zoospores are rounded to subspherical, posteriorly uniflagellate and possess a large oil droplet. The same species has recently been obtained also in sediments from the Weser estuary by Ulken (1968b) where salinity fluctuates between 10-20^o/oo.

Saprolegniales

Saprolengniaceae

3 - Saprolegnia sp.

Sterile, short, branched mycelia, bearing gemmae were found inside filaments of old Bryopsis plumosa fronds, collected below the water surface at Agigea.

Hypae are 4-7 μ wide and vacuolated; Gemmae up to 10 μ diameter. The fungus was kept in liquid cultures (salinity 9-23.9^o/oo), together with the host for 2 weeks, but no sexual stages were observed.

Thraustochytriaceae

4 - Thraustochytrium proliferum Sparrow

Johnson and Sperrow, 1961, p. 331, figs. 124, 125.

Sporangia (fig. 4) epibiotic, sessile, obpyriform to globose, ca 15 x 20 μ , smooth walled. Sporangial rudiment present. Zoospores are liberated by deliquescing of sporangial wall. They are nonmotile upon discharge. This latter character distinguishes this species mainly from T. Kinnei Gaertner.

The fungus was obtained in sediment cultures from Agigea Bay; in cultures of decayed Ruppia Leaves from "Media", together with other lower fungi.

5 - T. aggregatum Ulken, 1965 p. 291, pl. 2 figs. 3-6.

Zooporangia epibiotic, sessile, globose, 10-15 μ in diameter. Zoospores globose to angular, quiescent upon discharge, then become laterally biflagellated, reniform, or elongated. The fungus (figs. 5-7) forms botryoid colonies of spherical or oblong sporangia, loosely attached to the pollen bait, in agreement with Sparrow (1968). Polyhedral or tetrad phase (pl. I, fig. 5) was observed in our cultures as demonstrated also by Gaertner (1968).

The fungus was recovered from marine sediments at Agigea, as well as from sediments and epiphytic flora baited with pollen, from Lake Tekirghiol. This demonstrates the ability of this species to live in a wide salinity spectrum (9-80^o/oo).

6 - Schizochytrium aggregatum Goldstein et Belsky, 1964, p. 72-78; Schneider, 1968, p. 94 figs. 1, 2; Ulken, 1968a, p. 72, fig. 2.

Sporangial colonies in this species are enclosed within a common membrane (figs. 8, 9) which upon dehiscence released zooporangia (pl. 1, fig. 6). Each of the latter then discharges its zoospores through an irregular fissure in its wall as pointed out by Sparrow (1968).

The fungus was recovered from sediments of Tekirghiol Lake baited with pollen. It has been obtained by Ulken (l.c.) from the Thames Estuary and by Schneider from Baltic Sea sediments. It seems to have a

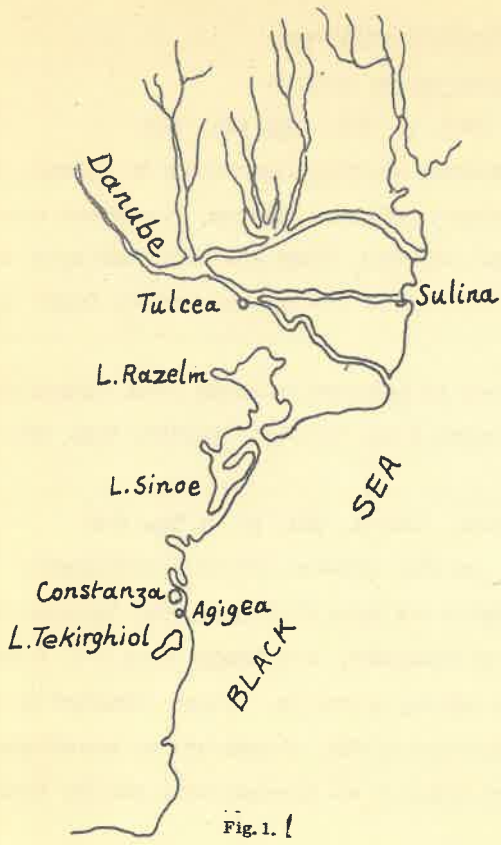


Fig. 1.

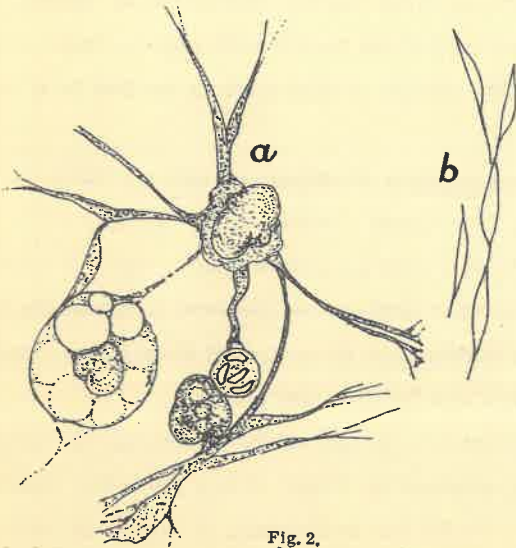


Fig. 2.

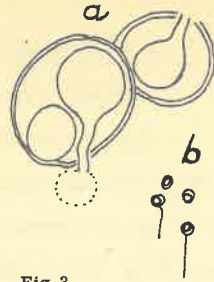


Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.

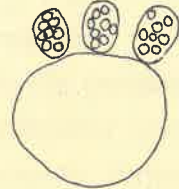
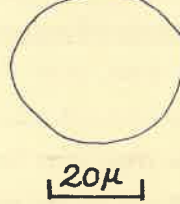


Fig. 7.



20μ

Fig. 8.



Fig. 9.

wide geographical distribution and is capable to thrive under extremely variable temperature and salinity conditions.

7 - Pythium marinum Sparrow, 1934, 8:5 fig. 1.

A large number of specimens of different Ceramium and Bryopsis spp. from Agigea littoral have been carefully examined. However, only one two occasions we met with this fungus (fig. 10) growing intramatrically inside both Bryopsis plumosa and Ceramium diaphanum from a depth of one meter below the sea surface.

Hyphae slender, sparingly branched, 2-4.5 μ in diameter with clavate appressoria (fig. 10a) Sporangia (fig. 10S) filamentous; zoospores laterally biflagellate, cleaving in a vesicle at sporangial orifice, ca 4 x 7 μ each.

Sexual organs were either lacking or incompletely developed. What seems to be an oospore (fig. 10-o), found inside Bryopsis, is rounded, amooth walled and measures about 14 μ in diameter.

The species bears affinities also to P. maritimum Höhnk (1939), and as pointed out by Johnson and Sparrow (1961) both species might as well be united together.

Lagenidiales

Olpidiopsidaceae

8 - Petersenia lobata (Petersen) Sparrow

In Johnson and Sparrow, 1961, p. 340, figs. 126-128

This fungus was discovered in Callithamnion corymbosum growing in the littoral region at Agigea. It has previously been recorded by the writer from various seas, e.g. in the Mediterranean Sea (1950) in the Skagerak, (1953) and in the White Sea in USSR (1962).

Sirolpidiaceae

9 - Sirolpidium bryopsidis (de Bruyne) Petersen

In Johnson and Sparrow, 1961, p. 348 fig. 132.

Recorded from Bryopsis plumosa growing under water at Agigea; also previously recorded by the writer from the Mediterranean Sea, from the Skagerak and from the White Sea.

10 - Pontisma lagenidioides Petersen

In Johnson and Sparrow, 1961, p. 351, figs. 129-131.

This fungus was parasitic inside Ceramium rubrum growing in the lower littoral at Agigea; also previously recorded by the writer from the same habitats as Petersenia lobata and Sirolopidium bryopsidis above mentioned.

DEUTEROMYCETES

(Fungi imperfecti)

11 - Diplodia orae - maris Linder

In Barghoorn and Linder, 1944, p. 403, pl. 1 figs. 1-3.

Conidia (fig. 11) are 2-celled, brownish, ca $8 \times 4 \mu$, borne on simple hyaline single-celled conidiophores.

The fungus developed in decayed wood kept in aquaria at Agigea.

It was also found in decayed wood from Mesura Bay, incubated in plastic bage for some days.

12 - Fusarium sp.

This fungus was rather common on submerged wood kept in aquaria with running sea water for two weeks. It also developed profusely on saw dust as well as on pollen kept in liquid culture media of salinities varying between 10 - 24^o/oo. Macroconidia (fig. 12a-e) are hyaline, 1-6 celled, fusiform, sickle-shaped or elongated with curved tip, nonconstricted at septa.

The larger spores measure $4-5 \mu$ broad and $40-50 \mu$ long. Microconidia (pl. I. fig. 4) are catenulate, branched, hyaline, ovoid or elliptical in shape. They measure $4-5 \mu$ in diameter and $5-8 \mu$ long.

13 - Alternaria maritima Sutherland

In Johnson and Sparrow, 1961, p. 392, fig. 166

This species (pl. I, figs. 1, 2) developed well in sediments from Agigea littoral baited with pollen; also on saw-dust, incubated in petri dishes with liquid media. It occurred often with Fusarium in the latter cultures.

Conidia are in chains, dark brown, ovoid, pyriform or attenuate, 15-50 (60) μ long and 5-12 (15) μ broad. Walls of Conidia are constricted at septa.

Single conidia were also encountered in surface plankton from Constanza Bay. The species was also detected on Salix twigs, immersed in sand and washed periodically by waves on the Agigea littoral.

Conidia of Alternaria which appeared in cultures baited with pollen, seem to be susceptible to infestation with an Olpidium (?) as shown on plate I, fig. (2).

14 - Macrosporium (Stemphylium) laminarianum Sutherland

In Johnson and Sparrow, 1961, p. 393.

This species was isolated from sediments from Agigea littoral baited with pollen in a medium of 24^o/oo salinity.

Conidiophores (figs. 13, 14 and pl. I, fig. 3) are simple, flexuous, septate, pigmented, thick walled, with their apex inflated.

Conidia are dark brown; ovoid, oblong or broadly ovate, acrogenous; apex rounded, with constrictions at transverse septa. They measure 35-70 x 15-25 μ .

Our specimens agree fairly well with the description of the species, particularly with regards to the habit and shape of the conidiophore and the proliferations from the swollen tips of fertile hyphae.

The position of the genus and its affinity to Stemphylium has been discussed by Johnson and Sparrow (l.c.) and by Kohlmeyer (1968). The latter author is in favour also of transferring the species to Stemphylium.

15 - Helicoma (Zalerion) maritimum Linder

In Barghoorn and Linder, 1944, p. 405, pl. II. figs. 2-6.

Conidiophores simple, septate, thin. Conidia (fig. 15) are deep fuscous 1-3 coiled, 4-14 celled, with constructions at septa, ovoid to oblong in shape, about 10-12 μ long and 6-8 μ broad.

The fungus was found on decayed wood of a tree trunk partially immersed in sand at Agigea littoral.

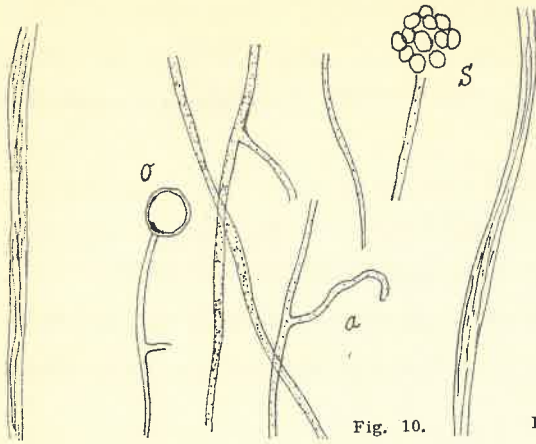


Fig. 10.

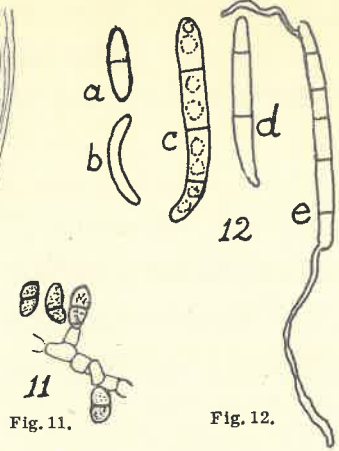


Fig. 11.

Fig. 12.

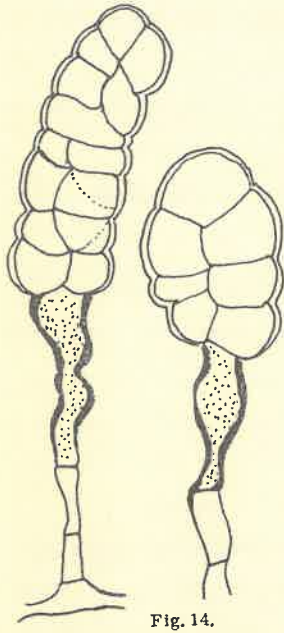


Fig. 13.

Fig. 14.



Fig. 15.



Fig. 16.

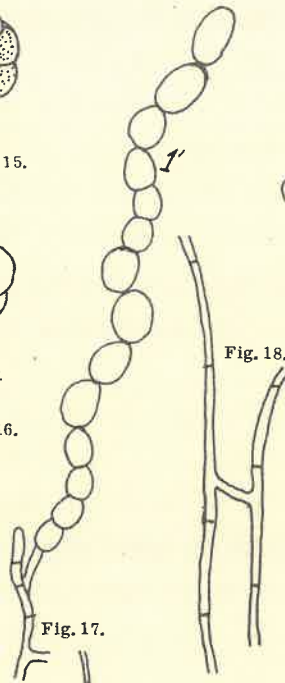


Fig. 17.

Fig. 18.

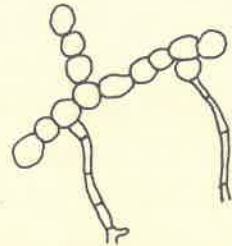


Fig. 19.



Fig. 20.



Fig. 21.



Fig. 22.

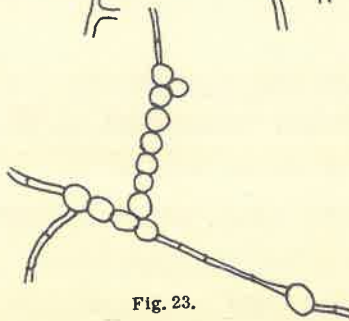


Fig. 23.



Fig. 24.

16 - Culcitalna (Trichocladium) achrospora Meyers et Moore

In Johnson and Sparrow, 1961, p. 386, figs. 148-151.

Conidia (fig. 16) yellow brown to dark brown, broad obpyriform or ovate, 3-4 celled; terminal cell larger than basal ones, almost-rounded; wall constricted at septa. The terminal cell in my specimen measures 13μ in diameter.

The material described was found once in a plankton sample from Constanza Bay.

17 - Cremasteria cymatilis Meyers et Moore

In Johnson and Sparrow, 1961, p. 381, figs. 157-158.

A fungus which could be referred to this species was found in drift wood in Lake Tekirghiol. Conidia (fig. 17) catenate, spherical to globose or oval, ca $10 \times 15 \mu$, generally increasing in diameter towards the distal end; sometimes initiating new cells at the apex. Conidia are slightly brownish in colour, sessile or produced on short lateral hyphae. Vegetative hyphae infrequently anastomose by hyphal bridges (fig. 18).

Chlamydospores are comparable to conidia in shape and size. Specimens with branched chlamydospores (fig. 19) were found also in decayed wood of a pier, slightly above water level at the Meteorological Station ($S = 10^{\circ}/\text{oo}$).

The identity of this species as pointed out by Johnson and Sparrow is not clear, since chlamydospores referred to it do not seem to differ from those of Ceriosporopsis halima and of its imperfect stage Helicoma salinum. Nor do they differ much from those of Halosphaeria mediosetigera (compare fig. 23).

18 - Dictyosporium (Speira) pelagica (Linder) G.C. Hughes

In Johnson and Sparrow, 1961, p. 391, figs. 162, 163.

This species was found in decayed wood from the Meteorological Station near Sulina. Conidia pale to dark brown and are arranged in clusters (fig. 20). Individual cells measure ca $5 \times 7 \mu$.

ASCOMYCETES

19 - Lulworthia sp.

In the absence of intact perithecia, it was difficult to identify species of this genus. However, several ascospores were found in macerated, putrified wood, kept in aquaria in running sea water at Agigea. These were one celled, hyaline, filiform and very narrow; each end of the spore is provided with a hyaline tapering appendage. These ascospores measured ca 200-300 μ long.

20 - Ceriosporopsis halima Linder

In Barghoorn and Linder, 1944, p. 409 pl. III, figs. 10-12.

Ascospores (fig. 21) ellipsoidal, hyaline, 20-25 x 8-10 μ ; 2-celled, each cell with a single large vacuole; a stout hyaline, tapering appendage is found at each end of the ascospore.

The species, as is known, is the ascigerous stage of Helicoma salinum Linder. It was found in decayed wood from a pier at the Meteorological Station, incubated in plastic bags; also found in decayed wood from Maliuc (limnetic water). In this latter case only coiled conidia were observed.

21 - C. (Remispora) hamata Höhnk

In Johnson and Sparrow, 1961, p. 451, fig. 202.

To this species we refer hyaline ascospores such as shown in fig. (22). These are 2-celled, with slight constriction at septum; each cell is provided with a large vacuole and ends with an appendage approximately equal in length to the length of the spore. However, these hyaline appendages are much thinner at the base than in the preceding species and are of equal diameter along their major length.

The fungus was found also in wood collected from brackish water at the Meteorological Station and incubated in plastic bags for some days.

22 - Halosphaeria mediosetigera Cribb et Cribb

In Kohlmeyer, J and E., 1966, p. 189-202.

Kohlmeyer (1966) give a full illustrated description of the life cycle in cultures of this species as compared with H. circumvestita.

It appears that we have both species in our collections.

Figure (23) shows intercalary chlamydospores which possibly belong to Halosphaeria mediosetigera found in decayed wood from brackish water at Sulina. No perithecia were found.

The species seems rather widely distributed.

23 - H. circumvestita Kohlmeyer, 1966, p. 189-202

Ascospores ellipsoidal, surrounded by irregular gelatinous sheath. Lateral and terminal appendages irregularly lobed. Ascospores (fig. 24) 2-celled, hyaline and constricted at septum, $16 \times 8 \mu$. Chlamydospores (fig. 25) are branched, ovoid, elongated or irregular in shape. The fungus was found in decayed wood from the Meteorological Station, also in drift wood in Lake Tekirghiol.

This species is also of a wide geographical distribution.

24 - H. tubulifera Kohlmeyer

In Johnson and Sparrow, 1961, p. 472, figs. 243-244.

Figures 26, 27 show two ascospores which seem to agree with those described for the species, particularly in the presence of a large vacuole in each cell and in the shape and size of terminal and lateral appendages. Spores are hyaline and slightly constricted at the septum, they measure about $20(25) \times 10-12$ exclusive of the appendages.

This species was also found in decayed wood of a pier at the Meteorological Station.

25 - Sphaerulina pedicellata Johnson

In Johnson and Sparrow, 1961, p. 498, figs. 266, 267.

Ascospores (fig. 28) hyaline, elongated, 4-6 celled, with one end cell attenuate and curved; not constricted at septa. In our specimens ascospores measure ca $55 \times 14 \mu$.

The fungus was found on decayed wood in the Agigea littoral, also once in plankton from Constanza Bay.

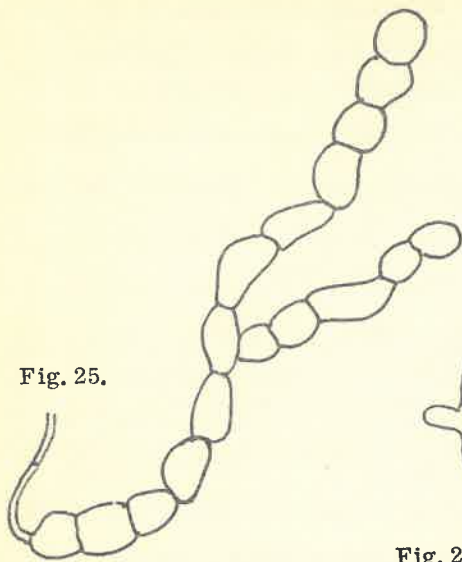


Fig. 25.

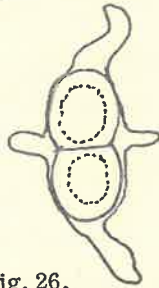


Fig. 26.

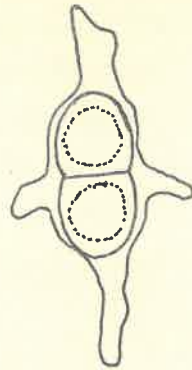


Fig. 27.



Fig. 28.

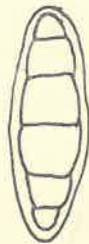


Fig. 29.

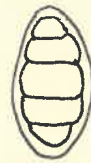


Fig. 30.

26 - Leptosphaeria maritima (Cooke and Ploweight) Saccardo

In Johnson and Sparrow, 1961, p. 503, figs. 270, 271

Ascospores (figs. 29, 30) yellow brown, 4-6 celled, straight or slightly curved, end cells rounded. In our specimens ascospores measure 25-40 x 10-13 μ .

The fungus was found in decayed wood at the Meteorological Station, in wood from Agigea; while two ascospores were encountered in a sample of surface plankton from the Bay of Constanza.

DISCUSSION

The majority of the marine fungi described here may be considered as new records for the Rumanian Coast and several among them are also new records for the Black Sea. Among lignicolous fungi only a few species seem to have been known previously in this sea, as for example, Halosphaeria mediosetigera (Kohlmeyer, 1959) and Helicoma maritima (Höhnk, 1967). The latter author also obtained stages of Thraustochytriaceae in sediment samples baited with pollen.

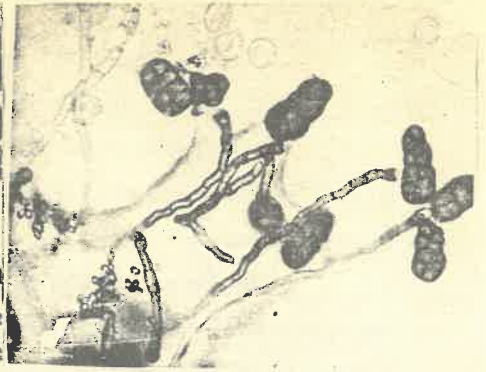
Three species belonging to this latter group have been identified by us, viz. Thraustochytrium proliferum, Th. aggregatum and Schizochytrium aggregatum. The first two of these were obtained from marine sediments, while the second and third species were also obtained from the supersaline lake "Tekirghiol". The fact that such species occur also in the Baltic Sea, in the North Sea as well as in North America, indicates the wide distribution of this group and the tolerance of its members to wider variations in temperature and salt concentration.

This is true also of members of Lagenidiales such as Siroldium bryopsisidis and Pontisma lagenidioides which appear to be obligate parasites on Bryopsis and Ceramium spp. from various parts of the world, including such diversified habitats as the cold brackish water of the White Sea (Aleem, 1962) and the warm, high-salinity water of the Red Sea (author's unpublished data).

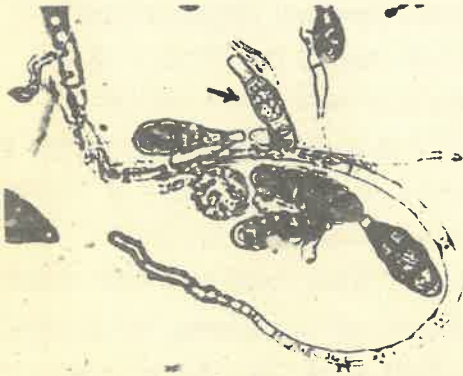
Among other Phycomycetes, Olpidium maritimum Höhnk and



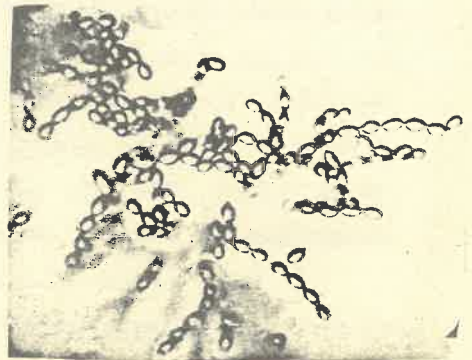
Planta 1



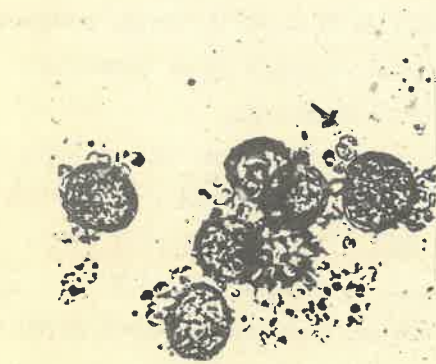
Planta 2



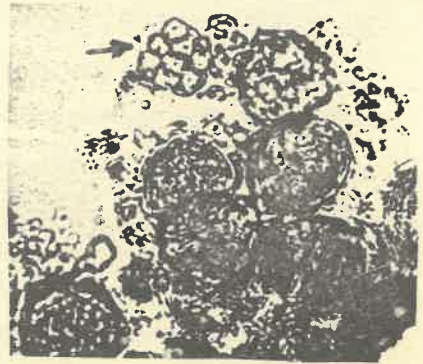
Planta 3



Planta 4



Planta 5



Planta 6

Aleem (1953) is also newly recorded in the Black Sea. This fungus was independently discovered by Höhnk and Aleem (l. c.). The former author obtained it in North Sea sediments baited with pollen, while the latter found it in nature inside floating Ruppia pollen in the étangs on the Southern Coast of France, during the flowering season of Ruppia maritima in spring.

It is of interest to remark also that Labyrinthula macrocystis which was originally described in marine algae from the Black Sea by Cienkowski (1867) has rarely been recorded again in this sea. This species has incidentally been found by the writer in the Bay of Naples (unpublished data). It has a wide distribution in several other places outside the Mediterranean Sea, including the North Atlantic Coasts of Europe and America.

Several of the wood destroying fungi belonging to the Deuteromycetes and Ascomycetes may eventually prove to be of a wider distribution than is known at present in the literature. Knowledge of these latter groups in marine and brackish waters is comparatively less than that of the Phycomycetes. Besides, as shown by Johnson and Sparrow (1961), by Kohlmeyer (1968) and others, several species that have been assigned to Deuteromycetes could be the imperfect stages of others belonging to Ascomycetes.

Among the fungi described in this paper, spores of four species were found in surface plankton collected in Constanza Bay. These are: Culcitalna achrospora, Sphaerulina pedicellata, Leptosphaeria maritima and Alternaria maritima. The latter species seems to be widespread in the region; besides, it appeared readily in cultures made at Agigea.

The Agigea littoral region yielded 16 species, including algicolous fungi, wood destroying fungi as well as fungi recovered from marine sediments. The latter were mainly species of Thraustocytrium, Alternaria, Fusarium and Macrosporium.

Lake Tekirghiol, with a salinity of about 80⁰/oo yielded, as already mentioned, Thraustocytrium aggregatum, Schizocytrium aggregatum and the lignicolous fungi: Cremasteria cymatilis and Halosphaeria circumvestita.

The brackish water habitats sampled in the Danube Delta yielded several species of Deuteromycetes and Ascomycetes on decayed wood from piers, which belong mainly to Cremasteria, Ceriosporopsis, Dictyosporium, Halosphaeria and Leptosphaeria. Several other species, represented only by incomplete stages of their life-history have also been encountered in Lake Razelm, Salina and in Mesura Bay. These could not be identified and are excluded from the list presented here.

The occurrence also of species like Halosphaeria circumvestita and Cremasteria cymatilis, simultaneously in low salinity water in the Danube Delta as well as in the supersaline water of Lake Tekirghiol demonstrates the ability of such wood destroying fungi to tolerate a wide range of salinity.

In conclusion, it appears from the results obtained in this brief survey that the Rumanian Coast is rather rich in marine fungal flora and a more thorough investigation of this, flora would be justified.

SUMMARY

An investigation of marine fungi along the coast of Rumania during the month of July, yielded 26 species. These include a single Myxomycetes, Labyrinthula macrocystis in addition to 9 spp. of Phycomycetes, 8 spp. of Deuteromycetes and 8 spp. of Ascomycetes.

This flora was recovered from marine algae, plankton, drift or submerged wood or from littoral sediments baited with pollen grains.

The habitats investigated included the littoral region at Agigea, brackish water stations in the Danube Delta, as well as a supersaline lake "L. Tekirghiol". The salinity in these habitats ranged between 3 and 80⁰/∞.

The majority of the species observed are new records to the Rumanian Coast and several among them are also new to the Black Sea.

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EXPLANATION OF FIGURES

- Fig. 1 - The Black Sea Rumanian coast and Danube Delta, showing localities where collections were made.
- Fig. 2 - Labyrinthula macrocystis from Bryopsis plumosa. Note sori and pellicles in (a) and spindle cells with slimeways in (b).
- Fig. 3 - Olpidium maritimum : (a) Sporangia with discharge tubes in pollen bait; one sporangium with a vesicle in (a) and zoospores in (b).
- Fig. 4 - Thraustochytrium proliferum; a sporangium with a rudiment.
- Fig. 5-7 - Thraustochytrium aggregatum developing on pollen. Note tetrad stages in figs. 5 and 6 and mature sporangia in fig. 7.
- Fig. 8,9 - Schizochytrium aggregatum on pollen of Verbascum.
- Fig. 10 - Pythium marinum in Bryopsis plumosa. (s = sporangial vesicle; a = appersorium; o = oospore)
- Fig. 11 - Diplodia orae-maris; conidia borne on single - celled conidiophores.
- Fig. 12 - Fusarium sp.; (a-e) various types of macroconidia developed on incubated saw-dust. Note growing conidium in (e).
- Fig. 13,14 - Macrosporium (Stemphylium) laminarianum ; 2 conidia borne on inflated, flexuous, thick walled, pigmented, conidiophores from cultures of baited sediments from Agigea littoral
- Fig. 15 - Helicoma (Zalerion) maritimum; a coil of conidia in wood from Agigea Littoral.
- Fig. 16 - Culcitalna (Trichocladium) achrospora. Conidia found in plankton.
- Figs. 17-19 - Cremasteria cymatilis; fig. (17), chain of conidia; fig. (18) anastomosing hyphae; fig. (19) chlamydo-spores.

- Fig. 20 - Dictyosporium (Speira) pelagica; a cluster of conidia in decayed wood from brackish water.
- Fig. 21 - Ceriosporopsis halima; ascospore.
- Fig. 22 - Ceriosporopsis (Remispora) hamata; ascospore.
- Fig. 23 - Halosphaeria mediosetigera; chlamydo-spores.
- Fig. 24, 25 - Halosphaeria circumvestita: Fig. (24) ascospore; fig. (25) chlamydo-spores.
- Figs. 26, 27 Halosphaeria tubulifera; 2 ascospores with large guttules.
- Fig. 28. - Sphaerulina pedicellata; 6-celled ascospore.
- Fig. 29, 30 - Leptosphaeria maritima; 2 ascospores.

PLATE I

- Figs. 1-2 - Alternaria maritima : Fig. (1) shows chains of conidia in cultures (x 300). The arrow in fig. (2) points to a conidium infected with Olpidium sp. (x 600).
- Fig. 3 - Macrosporium (Stemphylium) laminarianum. Conidia borne on tips of inflated conidiphores (x400).
- Fig. 4 - Fusarium sp. catenulate microconidia (x 400).
- Fig. 5 - Thraustochytrium aggregatum developing on pollen in cultures. The arrow points to a tetrad stage (x 400).
- Fig. 6 - Schizochytrium aggregatum. Arrow points to a sporangial colony on pollen (x 600).