



Some fungi isolated from submerged plant debris in Southern Iraq

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Abstract

Eight species of fungi occurring on different plant debris submerged in brackish water habitats collected from various locations, southern Iraq were described and illustrated. These included five species of ascomycota and three species of mitosporic fungi. The reported species are new records for the Iraqi mycobiota.

1- Introduction:

Fungi are the most diverse and ecologically important group of eukaryotes with the majority occurring in terrestrial habitats. Even though fewer numbers have been isolated from submerged woody substrata which support a high diversity of fungi in freshwater habitats (Shearer, 1993; Goh and Hyde, 1996; Hyde and Goh, 1998; Tsui *et al.*, 2003 ; Fallah and Shearer, 2003) and marine habitats (Kohlmeyer and Kohlmeyer, 1979; Kohlmeyer, 1984; Cuomo *et al.*, 1985; Hyde and Jones, 1989; Jones, 2000; Kohlmeyer and Volkmann Kohlmeyer, 2002), these fungi inhabit

ponds, swamps, pools) and lotic (rivers, streams, creeks, brooks) habitats (Wong *et al.*, 1998; Luo *et al.*, 2004), playing an important role in degrading and recycling organic matters in the ecosystem.

During continuous survey of fungi colonizing a variety of dead plant substrates submerged in freshwater and marine habitats in Iraq (Abdullah, 1983; Abdullah and Abdulkadir, 1987; Abdulkadir and Muhsin, 1991; Abdullah and Al-Saadoon, 1994a,b, 1995; Guarro *et al.*, 1996, 1997a,b; Al-Saadoon and Abdullah, 2001) several interesting species of ascomycetes and mitosporic fungi were

encountered from submerged wood substrates in aquatic habitats, Southern Iraq.

2- Materials and Methods :

Submerged plant materials were collected from several locations south of Iraq, these materials were placed in plastic bags and brought to the laboratory, rinsed with tap water, placed on moist filter papers in glass chambers and incubated at 25°C. Samples were examined periodically for any fungal growth. Cultures of fungi were obtained where possible from single spores, overall emphasis was placed on direct examination of fungi for morphological characterization. For ascomycetes, squash mounts of fungal fruiting bodies were prepared on slides mounted with water and then covered with cover slips for initial examination, water was replaced with lactophenol cotton blue for measurement and photography. India ink in distilled water was used to reveal gelatinous sheaths or appendages on or around ascospores. Permanent slides, dried specimens and/or living cultures were deposited at the department of Biology, College of Science, University of Basrah.

3- Description and Discussion:

Aniptodera fusiformis Shearer, Mycologia.81: 139 (1989). Figs.1 - 2.

Ascomata on natural substrate partially immersed or superficial globose,

hyaline, membranous, ostiolate, 70-125µm in diam., peridium of textura angularis, catenophyses present. Asci 8-spored, subglobose, thin-walled with an apical pore, deliquescent, 33-57x19-33µm. Ascospores hyaline, fusiform, bicelled with large oil globule not constricted at the septum, relatively thick-walled, 19-29x7-10 µm.

Specimen examined: On submerged wood and stem of *Typha australis* in brackish water, Al-Kahlaa river, Omara, Southern Iraq, 2009.

This species was originally described from submerged woody materials in freshwater habitats in USA (Shearer, 1989) however, the present collection was reported from brackish habitats. Some freshwater *Aniptodera* species may also occur in saline habitats (Jones *et al.*, 2009). The main features of the Iraqi collection are in agreement with the original description of Shearer (1989).

Beltrania rhombica Penzig, Nouvo G. Bot. Ital. 14:72 (1882). Figs.3 - 4.

Colonies on PDA growing rapidly filling the Petri dishes in 7 days at 25°C, brown to black, reverse black, mycelium immersed or partly superficial, setae erect, smooth, simple, dark, elongated over the conidiophore, appendages 2-17 µm long-1.8 µm wide at the base, conidiophores up to 122 µm long 3-8 µm thick. Conidia pale

brown, 1-celled with single apical protuberance sympodulosporous, smooth-walled, with a distinct hyaline transverse band, 23-31x 6-8 μm .

Specimen examined: On submerged dead stem of *Typha australis*, Abu-Al-Khasib, Basrah, Southern Iraq, 2009.

This species was recorded from dead leaves of many tropical plants and isolated from air, seeds and stems in many countries all over the world (Ellis, 1971), from pineapple field soil in Okinawa, Japan (Watanabe, 1971). Our collection was very similar to the type species in shape, pigmentation of its conidiophores and conidia, but differed in having shorter conidiophores.

Clavatospora bulbosa (Anast.) Nakagiri et. Tubaki, Bot. Mar. 28:489 (1985). Figs. 5 -6.

Colonies on PCA growing moderately at 25°C, gray black, reverse black. Conidia dark brown composed of basal bulbous hyaline to pale brown with 1-3 radiating arms, 2-5 septa at each arm and the cell constricted at the septa, 23-60x4-6 μm , chlamydo-spores 8-9.5 μm in diam.

Specimen examined: On drift wood and leaf bases of date palm (*Phoenix dactylifera* L.) in brackish water, Al-Kahlaa river, Omara, Southern Iraq, 2009.

This fungus has been described from wood submerged in freshwater in

Basrah, southern Iraq (Muhsin and Khalaf, 2002). This species extends its distribution to Omara city north east Basrah. In culture the bulbous basal cells may be absent and conidia develops a single row of brown cells (Jones et al., 2009). Kohlmeyer and Kohlmeyer (1979) referred to these as chlamydo-spores. The present isolate is closely similar to that described by Nakagiri and Tubaki (1985).

Corollospora pseudopulchella Nakagiri et. Tokura, Trans. Mycol. Soc. Jpn. 28:428 (1987). Figs. 7 - 8.

Ascomata on natural substrate 172-235 μm in diam. globose to subglobose, superficial, black, carbonaceous, solitary, peridium composed of dark thick walled cell, papillae 16-42 μm long, subcylindrical near the basal cubiculum pointing downward, paraphyses absent. Asci 8-spored, fusiform to ellipsoidal, 80-102x19-23 μm , unitunicate deliquescent. Ascospores fusiform, 6-8 septate, hyaline, 60-80x 6-8 μm , appendages fibrous, peritricous at both ends of the spore, 7-11.3 μm long and around the central septum 16-28 μm long, no anamorph was associated with this species, Specimen examined: On submerged wood and leaf bases of date palm (*Phoenix dactylifera* L.) in brackish water, Al-Kahlaa river, Omara, Southern Iraq, 2009.

Ascospore of *Corollospora pseudopulchella* is similar to that of *C. pulchella* in size and septation however, in the former species the ascospores is attenuated toward both ends and sometimes seems to have terminal appendages, but *C. pulchella* has ascospores with rounded ends. Our collection agreed well with the description of *C. pseudopulchella* by Nakagiri and Tokura, (1987). This species is a typical marine taxon and our knowledge from the literature that this species was not reported from brackish water thus it is for the first time to be recorded from brackish water in Al-Kahla`a river located faraway 200km from the Arabian gulf and this observation is unusual because this species is typical marine taxon which has been reported from sea-foam in Japan (Nakagiri and Tokura, 1987).

Cylindrocladium camelliae Venkataramani and Ram, Current Science 30:186 (1961). Figs. 9-11

Colonies on PCA and MEA growing rapidly reaching 90 μm in 7 days at 25°C, aerial mycelium white to cream colored, surface rust colored, reverse cream colored in the outer margin and rust colored in the inner region. Conidiophores 240x4 μm , erect, branched once or twice verticillately in the central parts, bearing spore masses at the phialides on the

branches with terminal vesicle. Vesicle 7-7.6x 3-6.5 μm , clavate or cylindrical. Conidia phialosporus, 8-13x2-2.5 μm , cylindrical, 2-celled, chlamydospores 9.3-13.3 μm in diam. over 3-spores in chain.

Specimen examined: On submerged leaf bases of date palm and stems of *Arundo donax*, Abu-Al-Khasib, Basrah, Southern Iraq, 2009.

This species has been isolated from root of *Phellodendron amurense* in Japan (Watanabe, 1994). Our isolate agreed with the description given by Venkataramani and Venkata Ram (1961) and this is the first report for the species from water habitat.

Jahnula bipileata Raja et Shearer, Mycologia. 98:321 (2006). Figs. 12-13.

Ascomata on natural substrate subglobose to obyriform, black, membranous, ostiolate, superficial with partially immersed base, 380-390 x 175-190 μm . Neck pale brown, 90-145x70-77 μm . Paraphyses septate slightly constricted at the septa, hyaline, filamentous, branching at anastomosing above the asci. Asci 170-200x9-15 μm , cylindrical, pedicellate with or without an apical chamber, 8-spored, uniseriate. Ascospores 20-26x8-10 μm , broadly ellipsoidal to fusiform, dark brown, 1-septate, slightly constricted at the septum, rough walled in an irregularly striated pattern, upper cell slightly broader than the

lower cell with hyaline caps at both apices, up to 2x2-3 μm , lacking a sheath.

Specimen examined: On submerged leaf bases of date palm, Abu-Al-Khasib, Hamdan river, Basrah, Southern Iraq, 2009 ; on submerged wood, Al-Kahla`a river, Omara, Southern Iraq, 2009.

Jahnula bipileata is morphologically most similar to the type of the genus *J. aquatica* however, the former species differed from *J. aquatica* in having ascomata with long cylindrical neck and irregularly striated rough-walled ascospores with a hyaline cap at both apices features not observed in *J. aquatica* (Raja and Shearer, 2006).

The present collections are in agreement with the original description given for the *J. bipileata* by Raja and Shearer (2006) who recently recovered it from USA on submerged decorticated wood in freshwater habitat. This finding represents the first report of the species from brackish habitat and dead leaf of date palm is perhaps a new substrate.

Nais inornata Kohlmeyer, Nova Hedwigia, 4: 409, (1962). Figs. 14-16.

Ascomata on natural substrate globose to subglobose, 250-300 in diam., black, ostiolate, papillate, membranous. Peridium of texture angularis, catenophyses present. Asci clavate, thin-walled,

unitunicate, 8-spored, 74-144x 20-33 μm , lacking an apical pore or thickening, deliquescent. Ascospores broadly ellipsoidal, 1-septate slightly constricted at the septum, hyaline, thin-walled with oil droplets forming inner wall ornamentations at the septum and at each end, 19-24x 8-13 μm .

Specimen examined: On submerged leaf bases of date palm in brackish water, Al-Kahla`a river, Omara, Southern Iraq, 2009.

This fungus is inferred from phylogenetic analysis of the partial large subunit ribosomal DNA sequences to be closely related to *Aniptodera*, forming a moderately supported monophyletic group with a bootstrap value of 89% (Pang *et al.*, 2003). *N. inornata* is a marine taxon, however it has been reported from brackish lake in Italy (Grasso and Laferla, 1985). This species has been isolated from submerged wood in brackish water southern Iraq (Muhsin and Khalaf, 2002), In the present study it has also been isolated from brackish water but on submerged leaf bases of date palm in Omara city, this fungus seems to extend its distribution to Omara province, North-East Basrah.

Natantispora retorquens (Shearer and J.L. Crane) J. Campbell; J.L. Anderson and

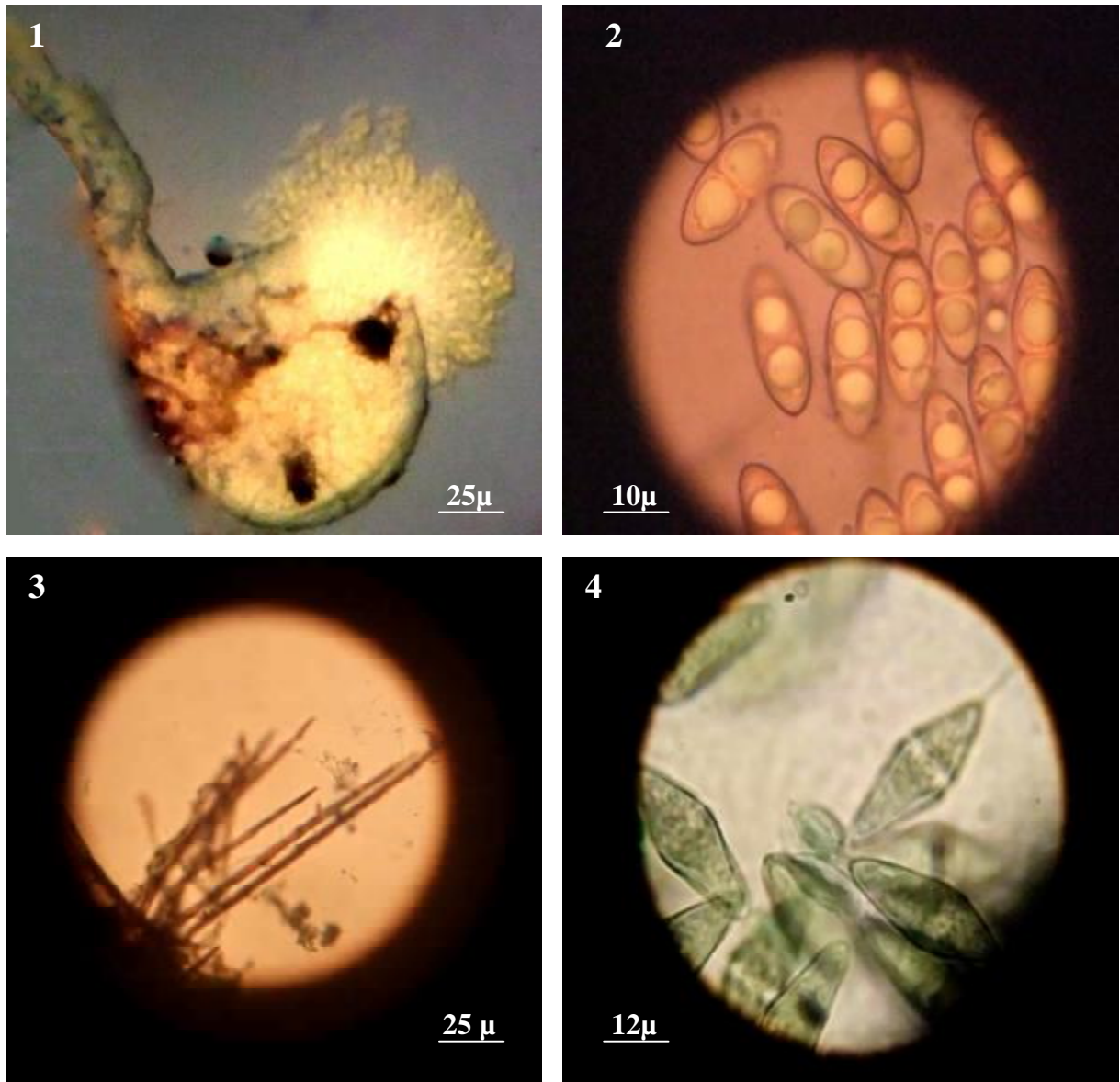
Shearer, Mycologia 95: 543 (2003).
Figs. 17-19.

Ascomata on natural substrate globose to subglobose, immersed or superficial, ostiolate, papillate, membranous black, 150-360 μm in diam. , periphysate, catenophyses present. Asci 100-112x12.5-19 μm , clavate, unitunicate thin-walled, 8-spored, deliquescing early. Ascospores 23-28x7-9 μm , fusiform to ellipsoidal, 1-septate, hyaline with ahamate appendage initially closely adpressed to the spore wall separating and unraveling to form long drawn out thread-like polar appendages.

Specimen examined: On submerged dead stems of *Typha australis*, Abu-Al-Khasib, Basrah, Southern Iraq, 2009.

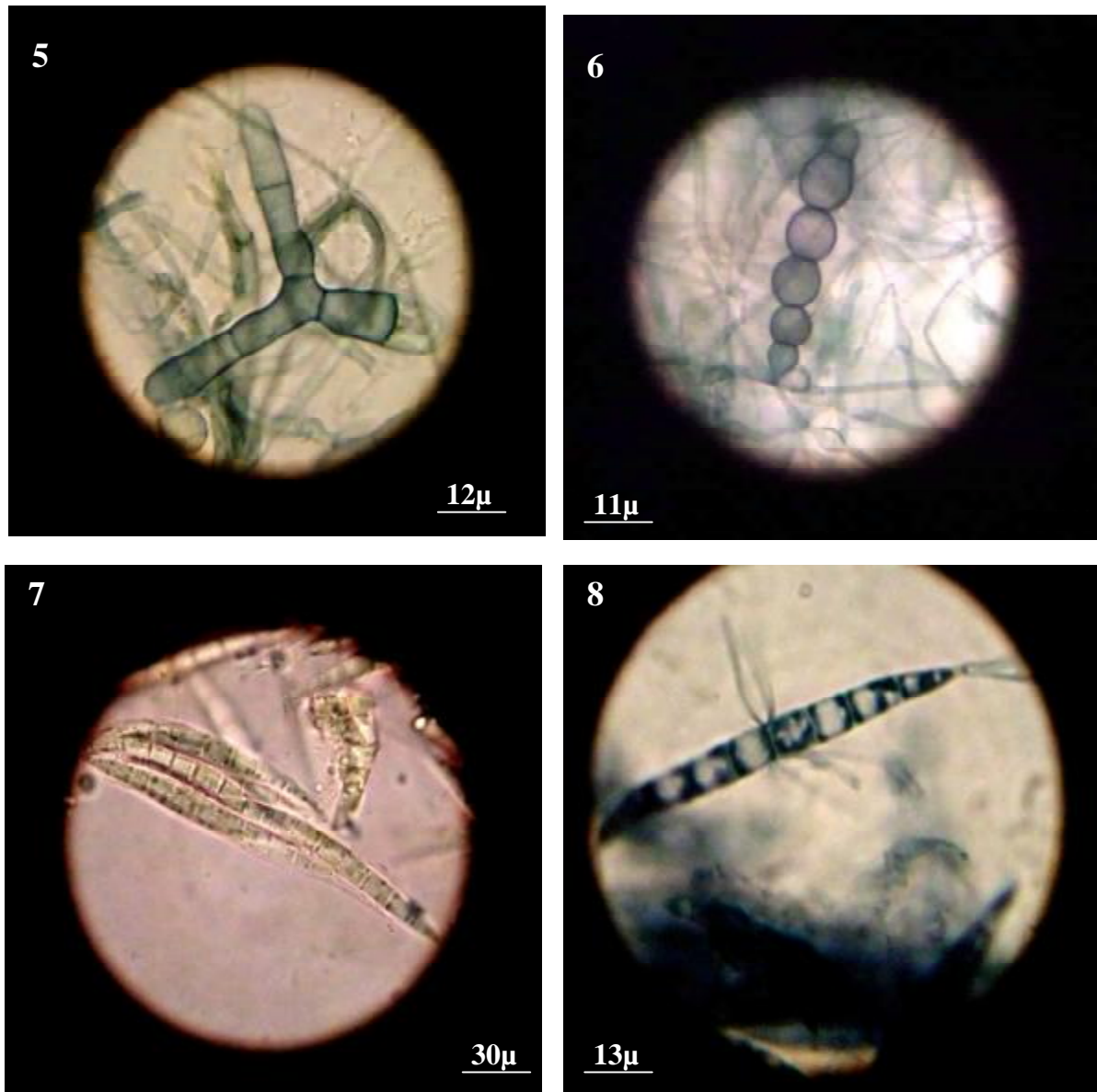
Campbell *et al.* (2003) segregated this species from *Halosarpheia* based on sequence data, although distinguishing morphological features at the genus level are not well established. From combined 18S and 28S sequences *Natantispora* species are distantly placed from *Halosarpheia* (Abdel-Wahab *et al.*, 2001).

This species was originally described only from freshwater habitats (Shearer and Crane, 1980), although it has been reported frequently from brackish and marine habitats (Kohlmeyer and Volkmann-Kohlmeyer, 1991). It is among the very few species of Halosphaeriales that occur in both freshwater and marine habitats (Campbell *et al.*, 2003).



**Figs. 1 -2: *Aniptodera fusiformis* , 1- A broken ascoma showing released asci ,
2- Ascospores.**

Figs. 3 -4: *Beltrania rhombica* , 3-Setae , 4- Conidia.



Figs. 5- 6: *Clavatospora bulbosa*, 5- Conidium, 6-Chlamydospores.

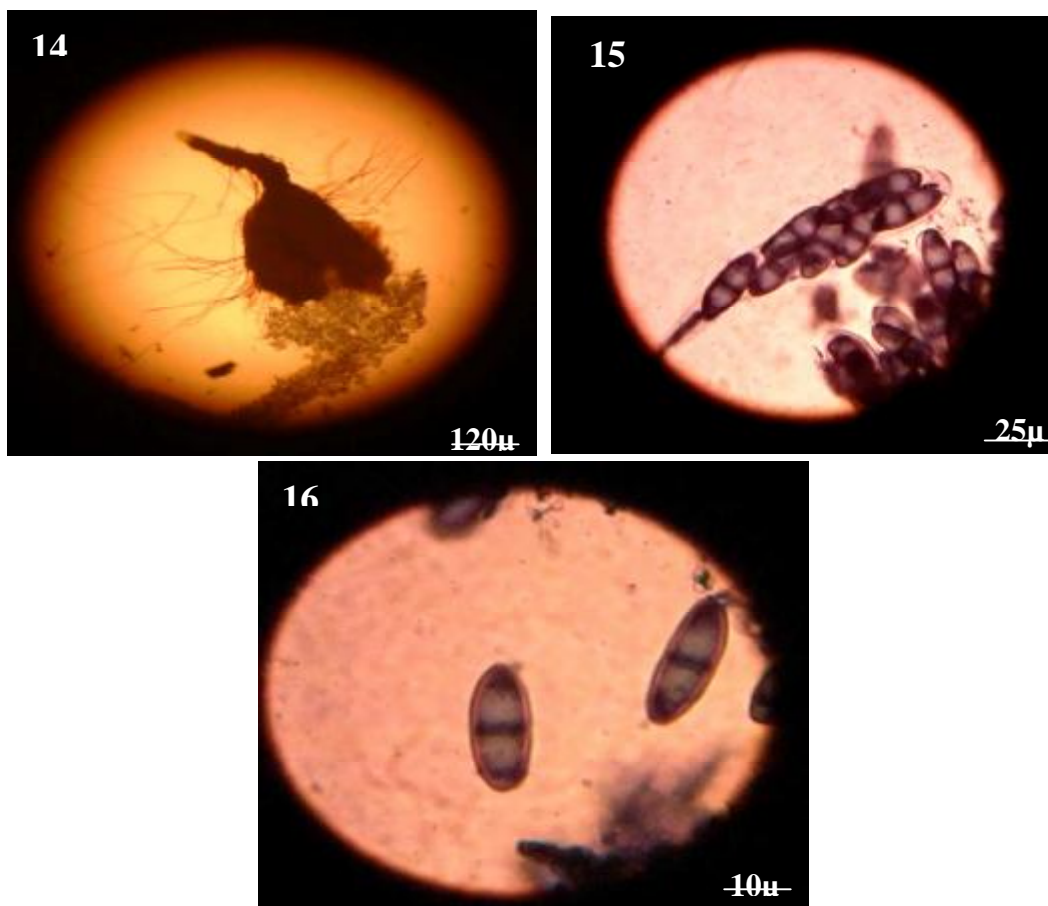
Figs.7 - 8: *Corollospora pseudopulchella*, 7-Mature ascus, 8- Ascospore with appendages



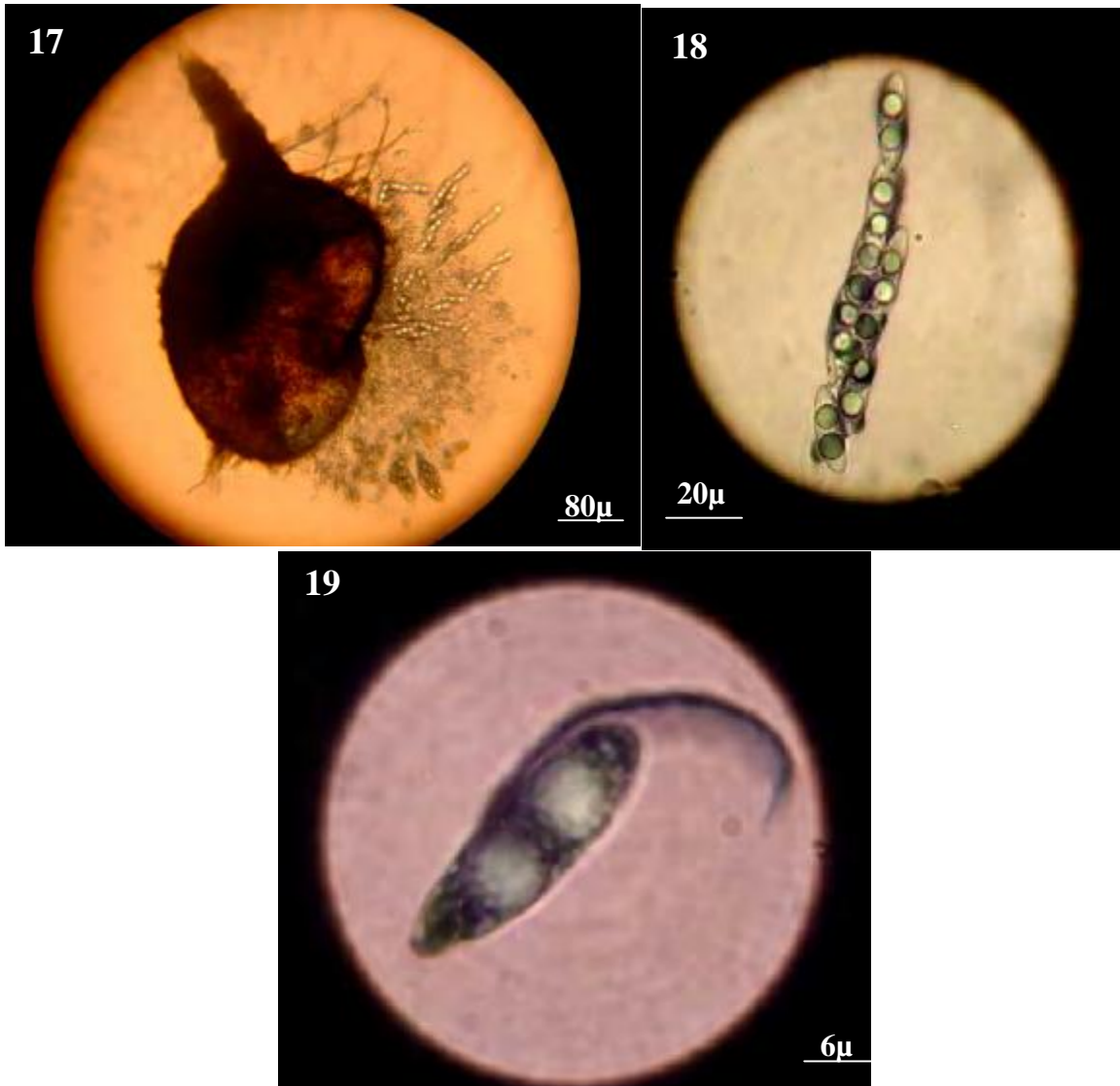
Figs. 9-11: *Cylandrocladium camelliae*, 9- Conidia, 10- Conidia and terminal vesicle, 11- Chlamydospores.



Figs. 12-13: *Jahnula bipileata*, 12- Mature asci, 13- Mature ascospores with hyaline cap.



Figs. 14-16: *Nais inornata* , 14- A broken ascoma releasing asci, 15- Mature ascus, 16- Mature ascospores in India ink.



Figs. 17-19: *Natantispora retorquens*, 17- A broken ascoma releasing asci , 8-Mature ascus, 19- Mature ascospore with appendage in India ink.

4- Acknowledgment:

We are deeply indebted to Professor Dr. Samir K. Abdullah, University of Dohuk, for his continuous support and to Professor Dr. E.B.G. Jones, Bioresources Technology Unit, Phylogenetics Laboratory, National Center for Genetic Engineering and Biotechnology, Thailand, for advice and confirmation of the identification of some species.

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بعض الفطريات المعزولة من القطع النباتية المغمورة في المياه جنوب العراق

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الخلاصة

تم خلال هذا البحث تسجيل ووصف (8) انواع من الفطريات وجدت نامية على انواع مختلفة من البقايا النباتية المغمورة في المياه المويحة جنوب العراق، وشملت (5) انواع من الفطريات الكيسية و (3) انواع من الفطريات الممثلة للحالة اللاجنسية للفطريات، وتعتبر الانواع المشخصة تسجيل جديد للمجموعة الفطرية العراقية.
