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Seven new records of ascomycetous macrofungi from Suliamaniya province (Northeast of Iraq)

Talib O. Alkhesraji

Biology Department /College of Education For Pure Sciences / Tikrit University

Abstract

The present study was carried out during march- may 2016 on macrofungi specimens collected from forests of Suliamaniya province in the northeast of Iraq . These forests are rich in tree species(Ex: *Quercus* spp. and *Juglans* sp.) with diverse groups of shrubs and herbs and are expected to harbour many macrofungal species . However , base – line data of macrofungi in Iraq has not generated till date . In this study , seven ascomycetous macrofungi: *Helvella acetabulum* , *H. compressa* , *H.costifera* , *H. crispa* ,*H. lacunose* (Pezizales : Helvellaceae) , *Morchella esculenta* (Pezizales : Morchellaceae) and *Tarzetta* sp. (Pezizales: Pyronemataceae) were reported from this province . These species were identified on the basis of macro and microscopic characteristics and are first records from Iraq .

Keywords: macrofungi , Pezizales , Suliamaniya province , Iraq

Introduction

Suliamaniya province ($35^0 31'$ N 45^0 19′E) as a part of mountain forest region (covering about 30,000 Km^2) of Iraq is located in the north – east of Iraq , bordering Iran and is bounded to the north – west by the Little Zab river and to the south – east by Diyala river .It lies between 500-2750 m a.s.l, with annual rainfall of 600 – 1200mm .This province is rich in plant flora species ,comprising tree species (Ex : *Quercus* spp. , *Acer* sp. , *Pistacia* spp. , *Juniper* sp.,*Populus* sp. and *Juglans* sp.) with different shrubs and herbs species .These plant species are expected to support a great diversity of macrofungi in the province. Despite of its biogeographic significance, northern Iraq including Suliamaniya province is still unexplored from macrofungal standpoint. However ,surveys on macrofungi were reported from some countries bordering Iraq like Iran (5,8,10) and Turkey (3,11,22,23,24,26 27). This paper deals with seven ascomycetous macrofungi new to Iraq.

Materials and Methods

Macrofungi specimens collections were carried out during march – may 2016 from different sites of Chuwarta (35^0 43′ N 45^0 34′ E : 20 Km NE Suliamaniya) , Zewiya –Pera Magrun area ($35^0$45′N 45^0 14′E : 2 – 3 Km S.S.E of peak of Pera Magrun: 30 Km N.W of Suliamaniya), Tawela –bordering Iran ($35^0$12′N 46^0 10′E : 18 Km E. by N of Halabja on Avroman range) and Kalar area(34^0 45′N 45^0 20′ E 105 km SW suliamaniya) in Suliamaniya province north – east of Iraq. In each site, habitat and substrates of macrofungi and altitude of the site (by using GPS) were recorded. Macro and microscopic characteristics of macrofungi were reported . Microscopic features were photographed by Sony digital camera attached to binocular microscope. The collected specimens were identified according to several literature keys and monographs (1,2,4,6,7,9,12-21&25,28,29). Specimens were preserved in FAA(formalin acetic acid alcohol) and kept in Biology Department , College of Education For Pure Sciences , Tikrit University .

Results and Discussion

During the survey of different sites of Suliamaniya province ,northern Iraq, seven macrofungal species, *Helvella acetabulum* (L.) Quel. *H.compressa* (Snyder)Weber , *H.costifera* Nannf. , *H.crispa* (Scop.)Fr. , *H.lacunosa* Afzel. , *Morchella esculenta* (L.)Pers. and *Tarzetta* sp. were reported. These fungi are reported here as new records to Iraq. Their description and distribution are given below.

Ascomycota

Pezizales

Helvellaceae

Helvella L.

Helvella acetabulum(L.)Quel.

Macroscopic features (fig.1):

Fruiting body (apothecium): cap: 1.5 – 7.0 cm broad , deeply cup –shaped (1-4 cm deep), margin bent toward hymenium when young ,sometimes flat and cracked in age ; upper surface (hymenium or fertile surface) yellow brown to dull brown, smooth or slightly wavy, lower surface (exterior or under surface) cream to light brown , paler near the stipe ,with forked whitish to cream – colored raised ribs that extend from the stipe to nearly the mid point of the cup ,sometimes ,extend to the margin of the cap ; stipe 1.5-3 cm long , 0.5- 3 cm thick, deeply ribbed to lacunose with sharp edged forking ribs that extend onto the lower surface of the cap, whitish to cream-colored.

Microscopic features (fig.2):

Spores: 18-21 x 12-14 µm, ellipsoid , smooth ,hyaline, with one large central oil droplet (10-13 µm). Asci , 275-350 x 15-20 µm ,cylindrical , tapering to base, operculate, hyaline, 8 spored. The paraphyses are cylindrical, hyaline, septate, rounded or clavate, tips 4 µm wide.

Solitary or gregarious among leaf litter in mixed forest of *Quercus infectoria , Q.aegilops* and other tree species , sometimes(with its related species *H.costifera*) frequently in close association (probably mycorrhizal) with roots of some herb species (awaiting identification) , occasionally showed branched stipes, edibility unknown, Chuwarta, Suliamaniya district, march – april. This fungal species was reported from Iran(5, 8,10) and Turkey (3,11, 22,26,27).

H. compressa (Snyder)Weber

Macroscopic features (fig.3) **:**

Fruiting body: cap: 2-3 cm across, saddle shaped, 2- lobed, lobes separated by v- shaped cleft, opposite margins rolled up over the upper surface and obscuring it when young and unrolling in age, upper surface grey to grey – brown, smooth , lower surface pale grey ; stipe 1.5-2.5cm tall , 0.5 cm thick , equal or tapered at top, not chambered, not ribbed, smooth, white, solid.

Microscopic features (fig.3)**:**

Spores 20-21 x 14- 15µm , elliptic , smooth , with one central oil droplet (10- 12.5 µm); asci 250 – 350 x 15 – 17.5 µm , cylindric , tapered to base , 8-spored; paraphyses clavate, 5- 7.5 µm wide at tip.

Scattered or gregarious in mixed forest of *Q. infectoria* and *Q.aegilops* ,edibility unknown, Chuwarta, Suliamaniya district, march-may. *H.compressa* was reported from Turkey (27). No information are available on this fungal species from other countries bordering Iraq.

H.costifera Nannf.

Macroscopic features (fig.4)**:**

Fruiting body: cap: 1-3.5 cm broad, the margin initially curved toward hymenium .upper surface grey to grey– brown, smooth, bald, lower surface greyish, powdery near the margin, with forked whitish, blunt, rounded edged ribs that extend from the stipe , sometimes extending nearly to the margin of the cup. Stipe: 1-2.5 cm in length, 1-2 cm thick, broader to the apex , narrow towards base, white, smooth, deeply ribbed with ribs extend into lower surface of the cap.

Microscopic features (fig.4)**:**

Spores 17. 5-20.0 x 11.5- 12.5µm , elliptical, smooth, hyaline ,with one central oil droplet (up to 12µm in diameter). Asci 250-325 µm x 12.5-14.0 µm , 8 spored . Paraphyses cylindric with clavate apices , up to 6 µm wide, septate, hyaline, arranged in bundles.

Scattered, growing amongst leaf litter in mixed forest of *Quercus infectoria* and *Q. aegilops*, probably mycorrhizal, edibility unknown, Chuwarta, Suliamaniya district, march-april. This fungal species is similar to *H. acetabulum* but the former species is distinguished by its greyish to greyish-brown cap rather than yellow – brown in *H.acetabulum* , ribs on its stipe are rounded and blunt edged rather than sharp-edged in *H.acetabulum* and its spores are slightly smaller than spores of *H.acetabulum* . This fungal species was reported from Iran (5) and Turkey (22,27).

H. crispa (Scop.) Fr.

Macroscopic features (fig.5) **:**

Fruiting body : cap3- 6 cm across , saddle- shaped ,irregularly lobed, when young with margin inrolled over the upper surface and obscure it ,expanding in age , upper surface smooth, creamy white, lower surface colored as upper surface; stipe 3-5 cm long, 1.5 – 2.5 cm thick, white, deeply furrowed , deeply ribbed , ribs sharp.

Microscopic features (fig.5) **:**

Spores 17.5 – 21.0 x 12.5 – 14.0 µm , ellipsoid , hyaline , smooth , with one large central oil droplet (10.0- 12.5 µm) and several smaller droplets at each end; asci 320- 400 x 15-20 µm, 8-spored. Paraphyses clavate, septate, hyaline, 5-7 µm wide.

Scattered in mixed forest of *Quercus infectoria* and *Q. aegilops*, edibility unknown, Chuwarta, Suliamaniya district, march-april .*H. crispa* was reported from Iran (5,10) and Turkey (3,22)

H. lacunose Afzel.

Macroscopic features (fig.6) **:**

Fruiting body : cap 0.5 – 2.5 µm across, irregularly lobed, margin attached to stipe in places , upper surface pale grey to black, lower surface pale grey to black , sometimes with ribs extending from the stipe ; stipe 0.5-3.0 µm high , 1.0- 1.5 µm thick , white , deeply furrowed, ribbed, ribs sharp edged .

Microscopic features (fig.6) **:**

Spores 17.5 – 20.0 x 11.0 – 12.5 µm, smooth, ellipsoid , with one large central oil droplet (10µm) ; asci 350 x 15 µm, 8- spored. Paraphyses clavate, cylindric, hyaline, septate .

Scattered or gregariously in mixed forests of *Q.aegilops* , *Q.infectoria* and Juglans sp. edibility unknown ,Chuwarta , Zewiya ,Suliamaniya district , march-april . *H.lacunosa* was found in Iran (5,8,10) and Turkey (3,22,26,27).

Pezizales

Morchellaceae

Morchella Dill.ex Pres.

M. esculenta (L.) Pers.

Macroscopic features (fig.7)**:**

Fruiting body: cap 2.5- 4.0 cm tall , 2-3cm wide , yellow – brown, conical to oval , hallow , covered with fertile pits separated by raised sterile ridges , lower margin fused to the stipe; stipe 2-3cm tall , 1.5 – 2.5 thick , pale cream , dark brown in age, hallow , smooth, tapering towards the apex .

Microscopic features (fig.7) **:**

Spores 22.5 – 25.0 x 15 – 17.5 µm , ellipsoid ,hyaline , smooth, without oil droplets , contents homogeneous; asci 350 – 400 x 20.0 – 22.5 µm , cylindrical, 8 – spored; paraphyses cylindric, clavate, septate ,hyaline, up to 20 µm wide.

Scattered or gregarious under *Juglans* sp. and disturbed areas in Tawela locality and under *Populus* sp. in Qula citow – Kalar locality. march - april. *M.esculenta* was found in Turkey (3,11,22,24,26,27).

Pezizales

Pyrenonemataceae

Tarzetta (Cooke) Lambotte

Macroscopic features (fig.8) **:**

Fruiting body: cap 0.5- 2.5 cm across, cup- shaped when young, expanding and splitting in age with finely toothed margin ; upper surface creamy, smooth with grayish white center in young cap , lower surface creamy in young stages but becomes brownish at maturity; stipe creamy, very short frequently buried in the soil.

Microscopic features (fig.9):

Spores 20- 24 x 12.5 – 15 µm , ellipsoid , smooth , hyaline , with two large oil droplets (7.5- 10µm); asci 200-300µm x 15 – 17.5µm , 8- spored; paraphyses cylindric, septate, clavate, sometimes slightly curved at the tip, branched at the base, hyaline.

solitary , gregarious or in small clusters among plant litter in mixed forest of *Q. aegilops* and *Q.infectoria*, Chuwarta locality,march- may , edibility unknown . This fungus was reported from Iran (10) and Turkey(3,23,26).

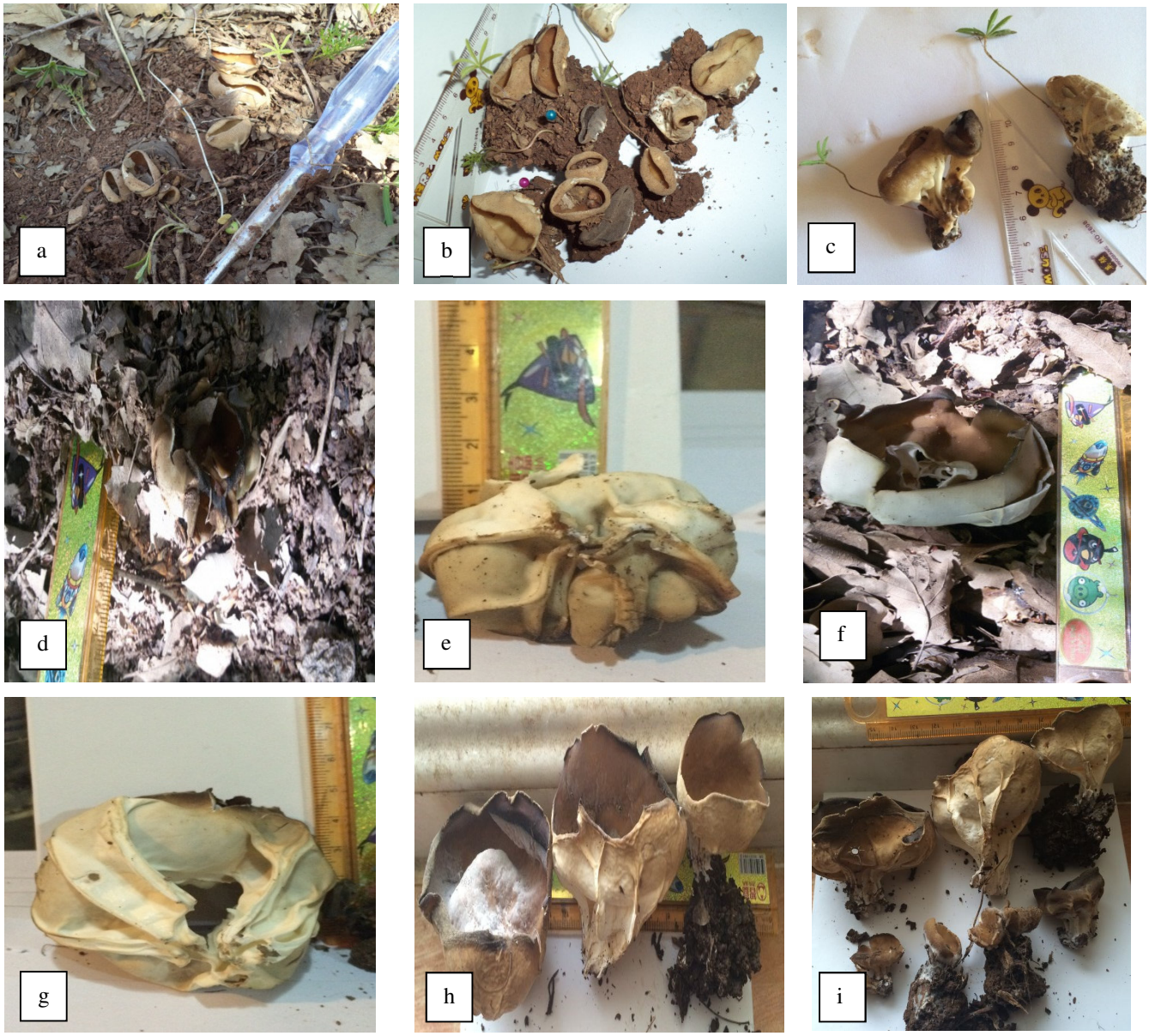

Fig. 1 .Fruiting body of *H. acetabulum* . a,d & f in natural habitat . Note: gregarious (in a) and solitary habit (in d &f) , close association with *H. costifera* (grey fruiting body) (in a & b), probable mycorrhizal association(in b &c), branched stipe (in c), cabbage leaf-like fruiting body (in d & e) and typical cup – shaped (in h & i) and prominent ribs on lower surface.

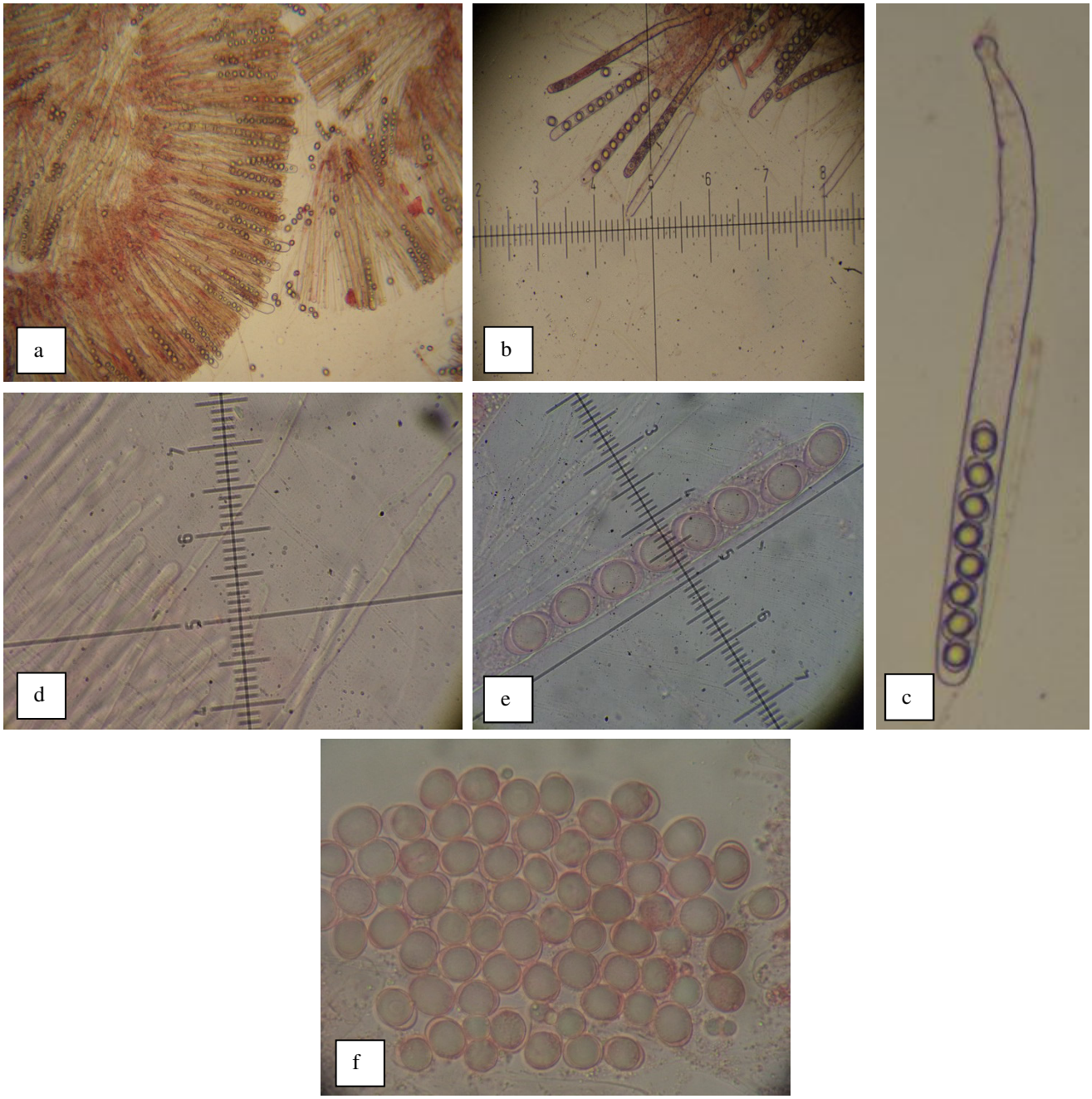

Fig. 2 . *H. acetabulum* . a, hymenium , b, ascus with ascospores (b & c), paraphyses (d), spores with single large oil droplet (e & f).

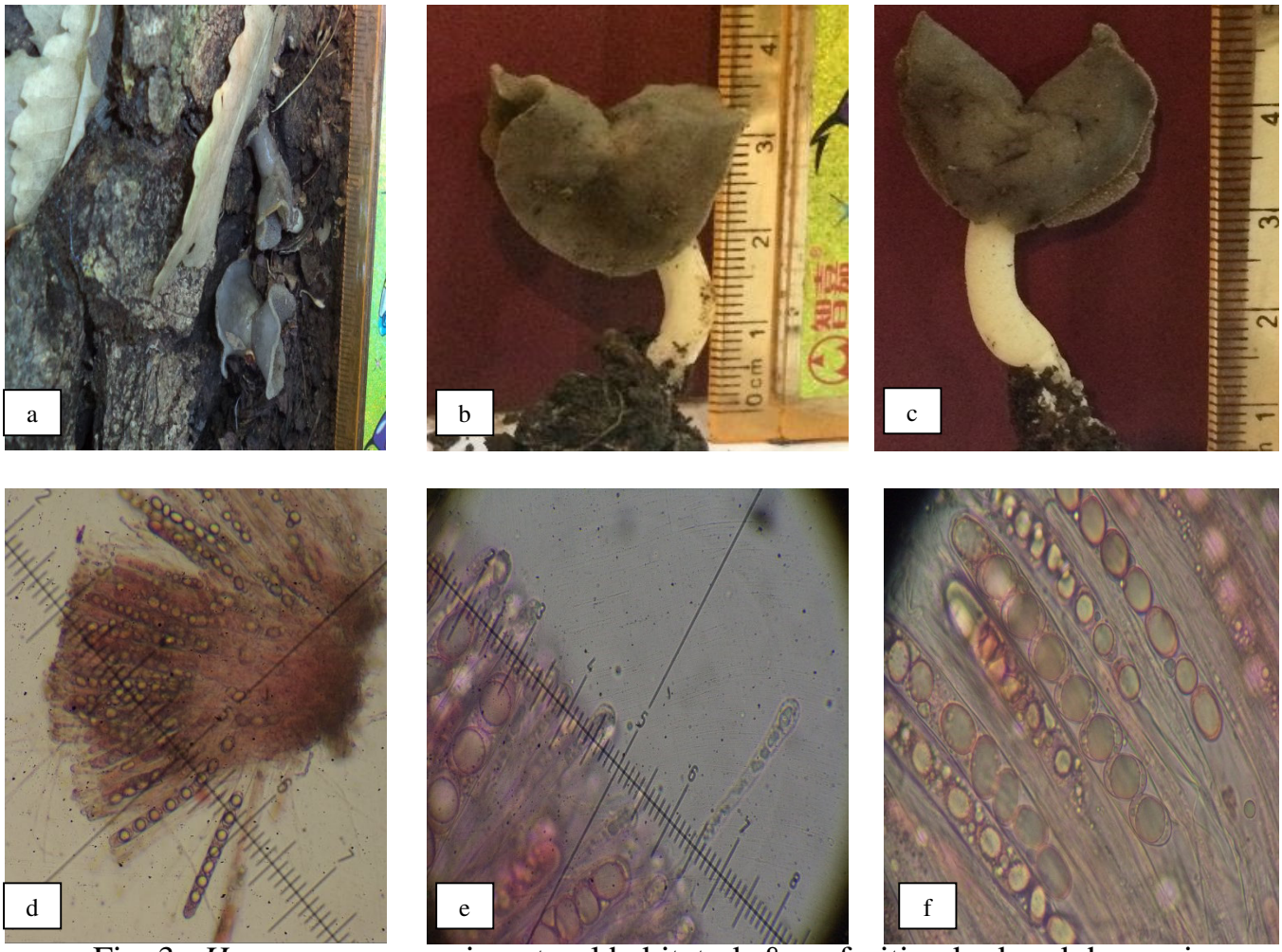

Fig. 3 . *H. compressa* . a , in natural habitat ; b & c , fruiting body ; d, hymenium ; e , paraphyses ; f, ascus with spores.

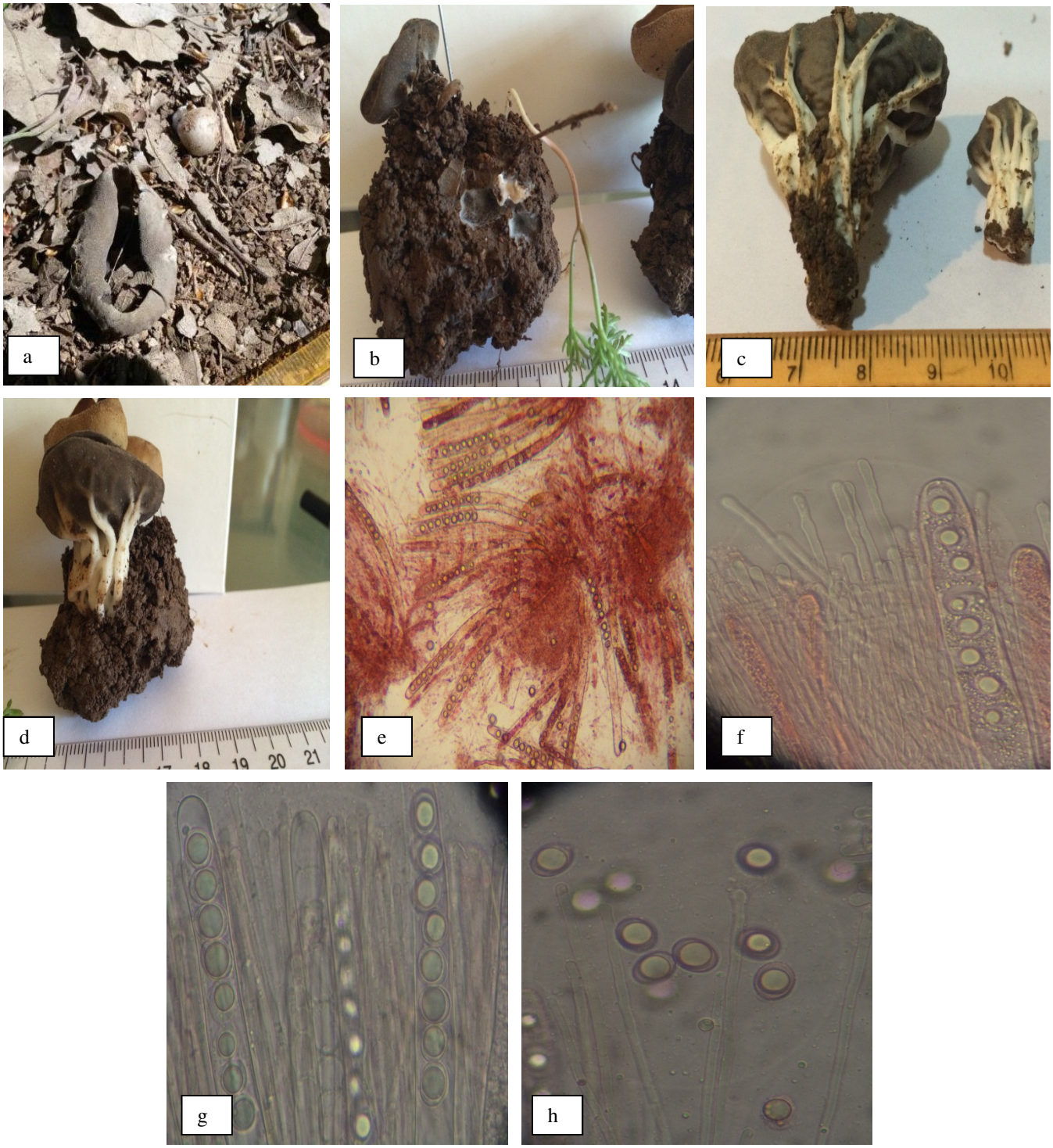

Fig.4 . *H. costifera*. a, in natural habitat; b, probable mycorrhizal association; c, ribs on lower surface; d, close association with H. acetabulum; e, hymenium; f, paraphyses ; g , ascus with spores; h , spores with oil droplet.

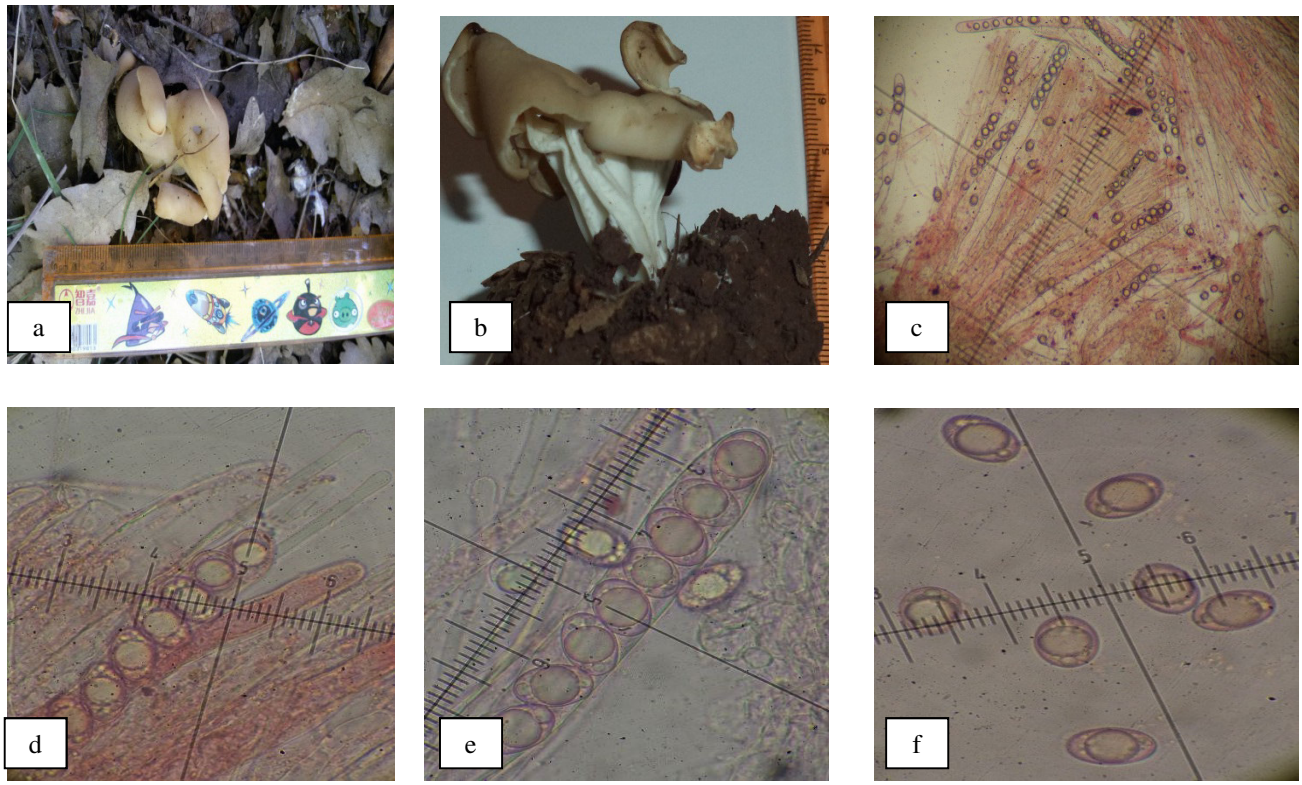

Fig. 5. *H.crispa*. a, in natural habitat ; b, fruiting body; c, hymenium ; d, paraphyses ; e, ascus with spores ; f, spores with oil droplet.

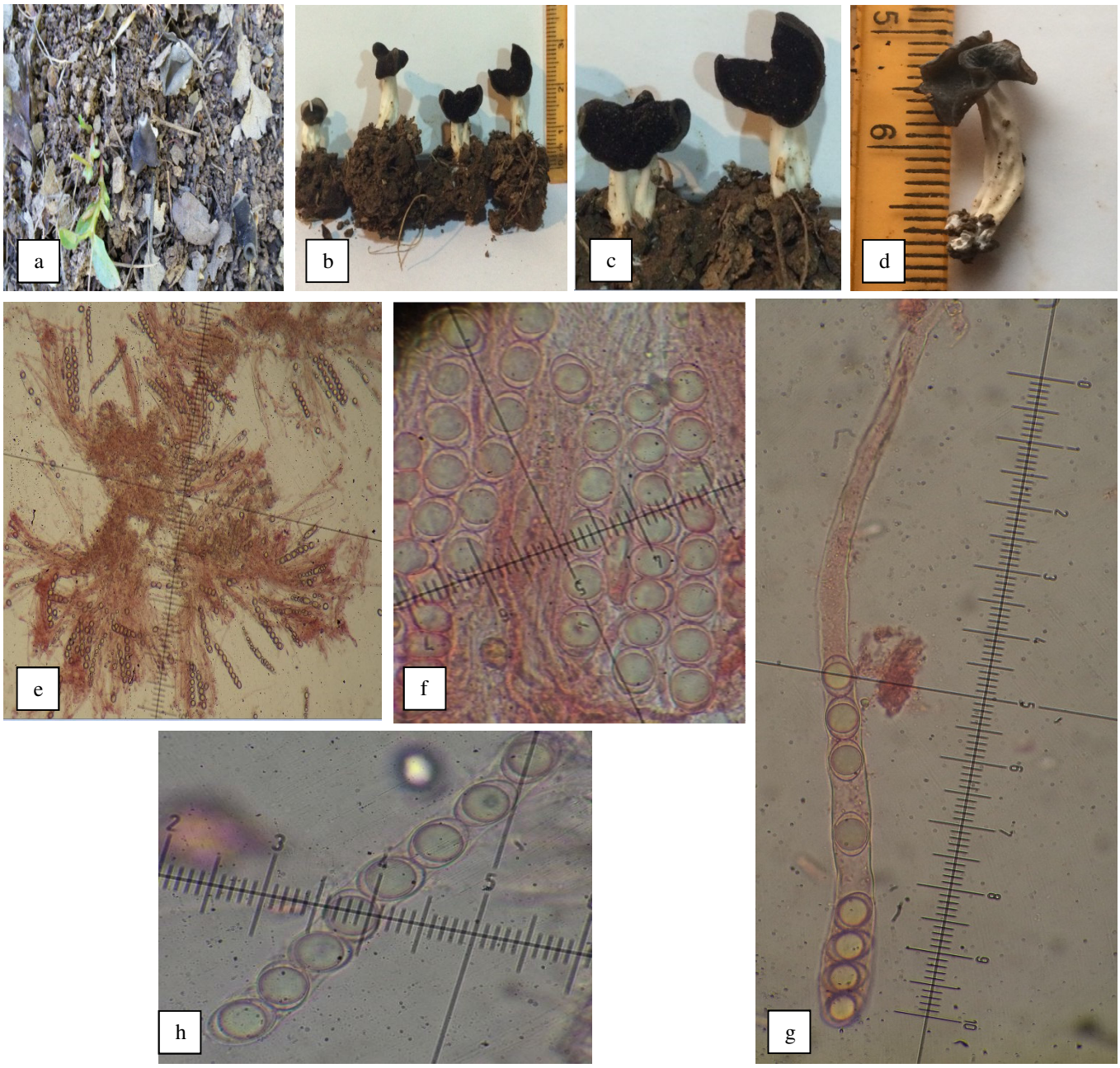

Fig. 6 . *H. lacunose* . a , in natural habitat ; b – d , fruiting body ; e, hymenium ; f& g, ascus with spores; h, spores with oil droplet in ascus.

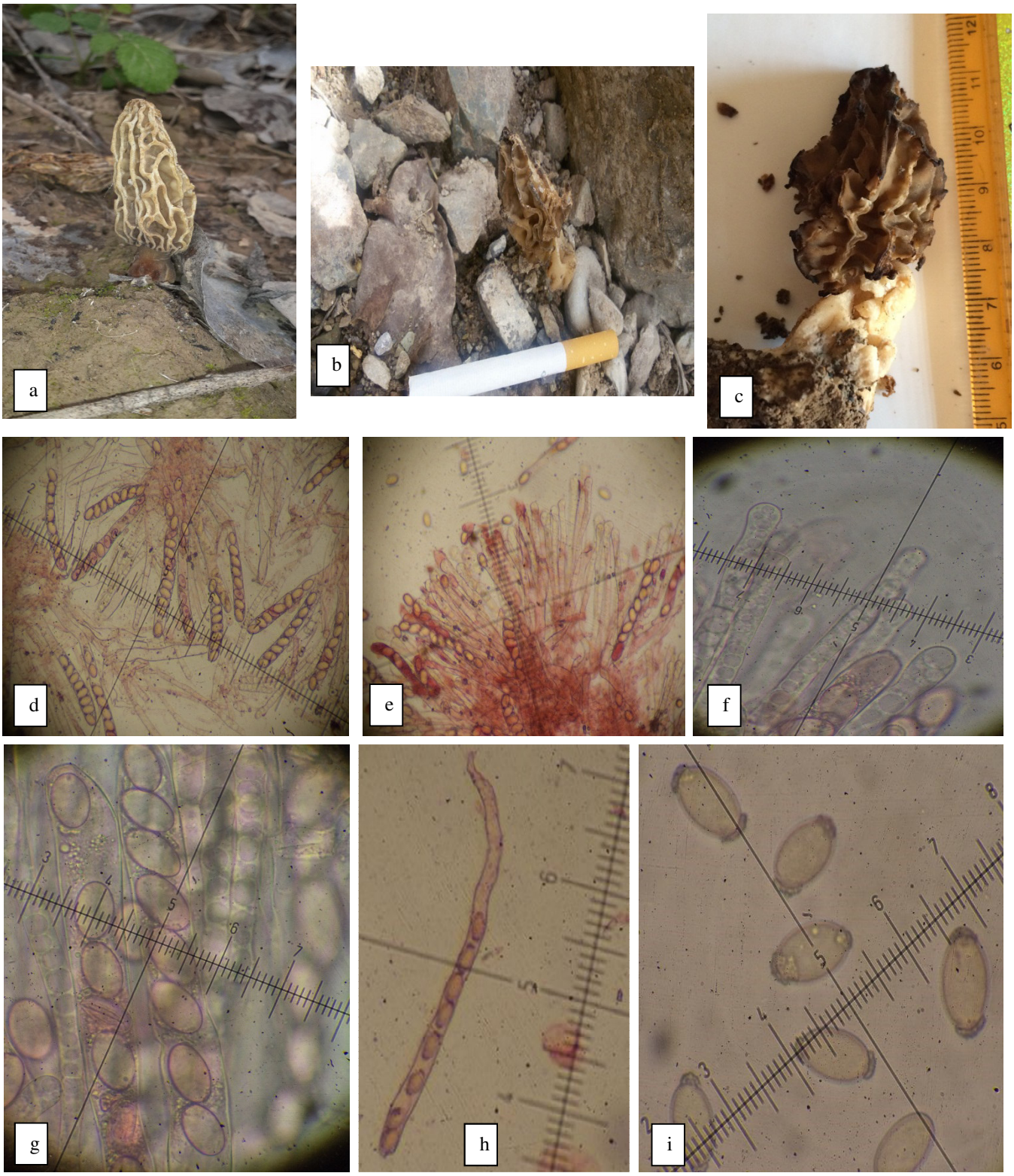

Fig. 7 . *M. esculenta*. a&b in natural habitat; c, fruiting body; d, hymenium ; e &f, paraphyses; g &h, ascus with spores; I, spores with homogeneous contents.

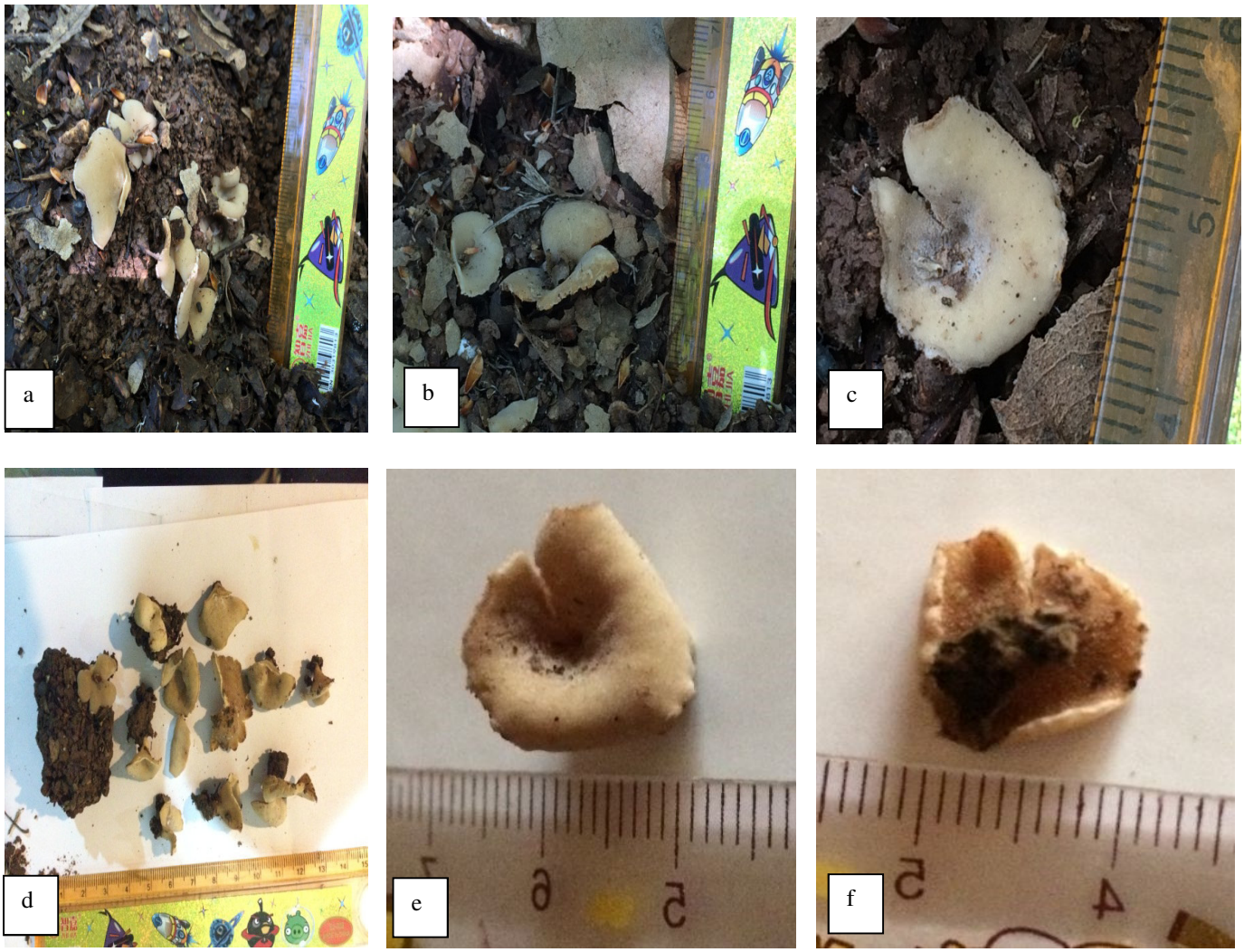

Fig. 8. *Tarzetta* sp. .a-c, in natural habitat ; d-f , fruiting body (e, f, upper and lower surfaces respectively) .

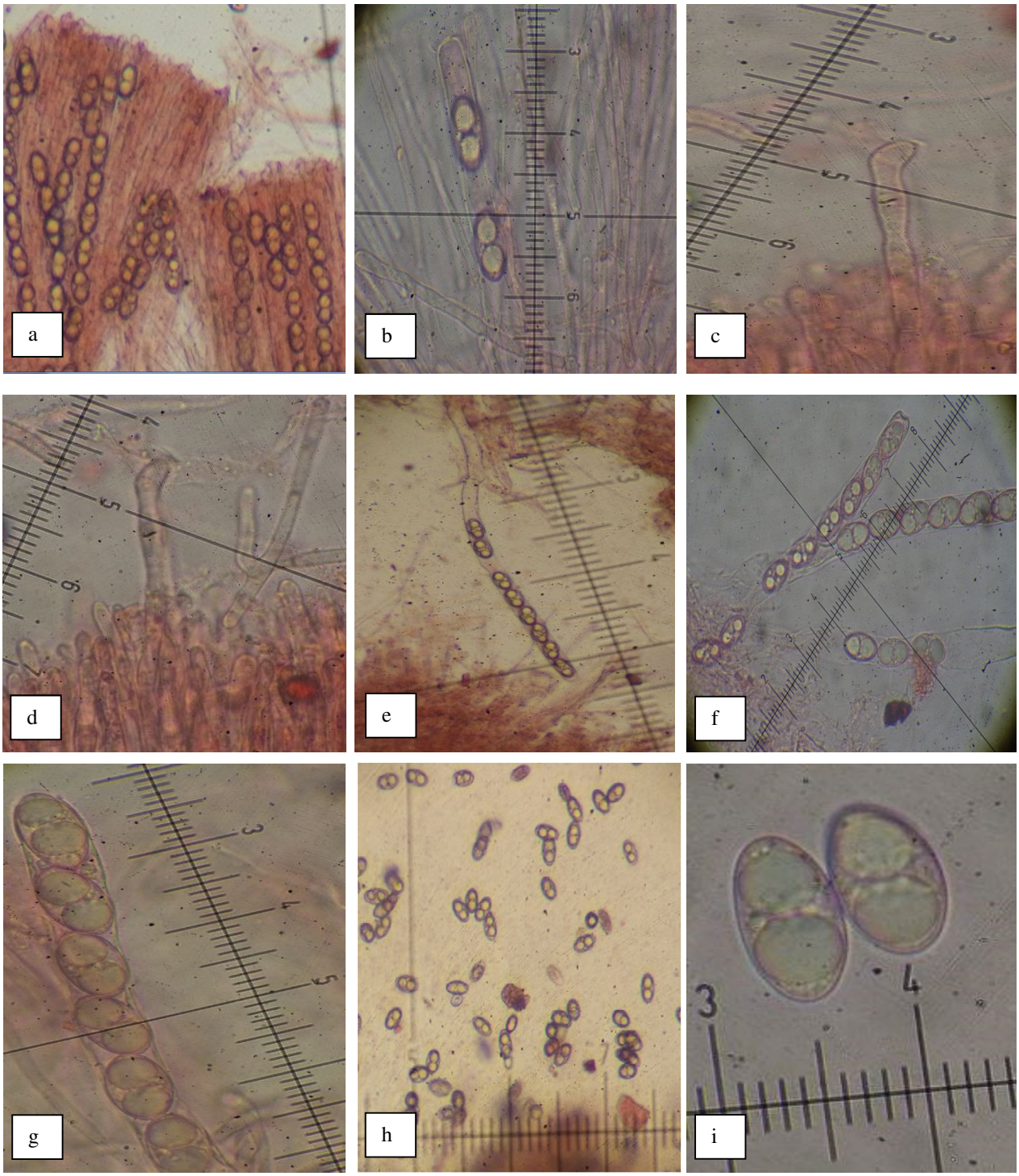

Fig.9 . *Tarzetta* sp. .a , hymenium ; b-d , paraphyses (note : apex , septa and branching near base) ; e-g , ascus ; h & I , spores .

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