Studies in Gasteromycetes V.

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A new species of Octaviania Vitt.

Octaviania Longiana Ahmad sp. nov.

Sporophore obovate or pyriform, 7.5—8 ⇌ 13—16 mm., epigeous, attached by a well developed rooting base; yellow, not changing colour when bruised or cut. Peridium 80—100 μ thick, of a single layer of loosely woven hyphae, separable at maturity. Gleba yellowish to Saccardo's umber, firm but soft and easily sectioned; cavities irregular or elongated, filled with spores; tramal plates appearing whitish under a lens, of non gelatinized loosely woven hyphae. Spores globose or sub-globose, some nearly oval with a distinct apiculus in most cases, 4.5—6 μ in diameter; epispore smooth, about 0.65 μ thick, pale brown or yellowish.

Habitat: On the ground amongst grass.

Locality: India: Rohtak, December 7, 1945, leg. S. Ahmad, no. 1514, type.

Obovata vel pyriformis, 7.5—8 ⇌ 13—16 mm., epigaea, basi radicanti bene evoluta insidens, lutea; peridium 90—120 μ crassum, leve, simplex, ex hyphis laxe contextis compositum in maturitate separabile; gleba luteo-brunnea usque umbrina (Saccardo), solida sed mollis atque facile sectilis; cavitates irregulares vel elongatae, labyrinthiformes, sporis plus minusve farctae; tramae laminae sub lente albescentes, ex hyphis non gelatinosis, laxe contextis compositae; sporae globosae vel subglobosae, nonnullae fere ovatae, apiculo distincto interdum praeditae; 4.5—6 μ; episporium crassum, leve, ca. 0.65 μ crassum, pallide brunneum.

I have followed Coker & Couch, Fischer and Cunningham in considering the genus *Octaviania* Vitt. as valid, with *O. asterosperma* Vitt. as the lectotype. The species is distinctive in its epigeal habit, basal attachment like *Lycoperdon* and small smooth spores. It is dedicated to late Dr. W. H. Long, Albuquerque, New Mexico.

Order: Gastrosporiales.

Gastrosporium simplex Mattirolo in Mem. Real. Accad. Sci. Torino Ser. II, Tom. LIII, p. 364, 1903; Sacc. Syll. Fung. XVII.

p. 242; Fischer E. & P. Bd. VII. a, p. 42, 1933; Pilat in Bull. Myc. Soc. Fr. L. p. 38, 1934; Fischer Berichte der Schweiz. Bot. Ges. XLV, p. 239, 1936.

Sporophore hypogeal, globose, oval or irregularly lobed, 8—15 mm. in diameter, the surface in young specimens covered with sand particles, white at maturity; peridium double, an outer primary peridium 150—350 μ thick, formed of interwoven hyphae and an inner tramal peridium 200—500 μ thick, of closely packed interwoven hyphae, gelatinous, continuous; gleba developing centripetally without columella or sterile base, powdry at maturity, deep olive buff to cream buff, consisting of pseudocapillitium and spores; pseudocapillitium when present very hyaline, branched, septate, 3.5—5.5 μ thick, sometimes attenuated at the apex into long narrow processes; spores globose or subglobose, pale yellowish, hyaline under the oil immersion, 3.5—4 (4.5) μ; epispore medium thick, smooth.

Locality: Panjab: Ladhar, Sheikhupura, Sep. 30, 1945, leg. S. Ahmad, no. 1441. Very rare.

The fungus is widely distributed through out the mediterranean region but this appears to be the first record in any other part of the world.

The systematic position of the genus has been a problem for a long time. It was placed by Ed. Fischer (1933, l. c.) under „Gattung, deren Zugehörigkeit zu den Sclerodermataceen noch unsicher" with the remark „Da nur ganz reife Exemplare mit pulverigen Sporenmassen bekannt sind und der Bau der Gleba sowie die Art der Sporenbildung unbekannt sind, so bleibt die Stellung dieses Pilzes zweifelhaft. Wir stellen ihn wegen des Fehlens eines Capillitiums hierher." Pilat (1934, l. c.) discussing the systematic position of the genus says „Il est assez difficile de placer le genre *Gastrosporium* dans le système des Gastéromycètes; il n'est en effet conforme à aucun des groupes admis: ainsi il réunit certains traits des *Bovista (Lycoperdaceae)* à d'autres appartenant aux genres *Hymenogaster* et *Rhizopogon (Hymenogastraceae);* par ailleurs il rappelle même les *Plectobasidiineae.* As it differs from all known *Hymenogastraceae* in the well marked double peridium and powdry gleba and from *Lycoperdaceae* in the development of the receptacle, absence of capillitium and the manner of dehiscence so according to Pilat, it is necessary to create a new family *Gastrosporiaceae* within the order *Hymenogastrales.*

Although the development of *Gastrosporium* resembles some of the *Hymenogastrales,* the powdry gleba is something unknown in the whole group. In powdry gleba it approaches the *Lycoperdales* but differs in the centripetal development of the gleba, the peridium

structure and the absence of capillitium. According to Fischer (1936, l. c.), therefore, „Es bleibt also bis auf weiteres nichts anderes übrig, als eine besondere Unterreihe *Gastrosporaceae* aufzustellen, die in der Höhe der Organisation den Lycoperdineen koordiniert ist und sich nach unten an *Hymenogaster Rehsteineri* und eventuell *Dendrogaster* anschliesst."

Zeller (1948) *) has recently erected a new order *Tremellogastrales* with two families *Tremellogastraceae* and *Gastrosporiaceae*. I think it is through oversihgt as the order *Gastrosporiales* of Fischer could equally serve this purpose.

Regarding the distribution of the fungus Pilat (1934, l. c.) remarks „a mon idée le *Gastrosporium simplex* doit se trouver non seulement en Italie et en Bohème, mais dans toute la région méditeranéenne, en Slovaquie, en Hongrie, en Russie méridionale et même en Siberie; on le trouvera sans doute dans la France méridionale." In addition „on doit certainement le retrouver dans d'autres pays où les conditions de vie sont analogous".

The conditions of life as outlined by him are as follows: „Toutes les localités où ce champignon remarquable a été trouve en Bohème montrent le même caractère steppique; ... ce sont généralement des pentes exposées au sud, à sous sol calcaire, non boisées, désséchées en été et brûlées par le soleil. La temperature peut s'élever a la surface du sol jusqu'à 45° C pendant l'été."

Regarding vegetation the region: „*Stipa capillata* L. est l'herbe prédominante; *Carex humilis* Leyss. est trés répandu avec une série d'autres plantes thermophiles." The typical plant association consists of the following species:

Stipa capillata, Carex humilis, Festuca valesiaca, Koeleria gracilis, Andropogon Ischaemum, Potentilla arenaria, Asperula Cynanchica, Sanguisorba minor, Thymus praecox, Centaurea rhenana, Eryngium campestre, Sedum album, Teucrium Chamaedrys. Pilat believes that the fungus grows only where this association is typical and if the ecologico-microclimatical condition change it disappears although certain of the characteristic plants are still present. The fungus is therefore regarded by him as a very good indicator of the characteristic association. The genus *Gastrosporium* has also another importance as an ecological indicator. According to Pilat „Le *Gasteromycetes* sont en effet pour la plupart cosmopolites au contraire, les Phanérogames ont des aires relativement restreintes, en sorte que, suivant les régions; les mêmes conditions écologiques déterminent des associations différentes. De la présence de notre champignon on pourrait donc conclure à des conditions écologiques

*) Mycologia XL. p. 661, 1948.

identiques à celles qui, dans nos régions, donnent naissance à l'association *Festucetum Valesiacae.*"

For topographical and climatic details of the habitat in the Panjab plains cfr. Long & Ahmad (1947) *).

The plant was discovered on the sides of a water course which is exposed and without overshadowing tree or shrub. The water course is regularly cleared of slit which is deposited on the sides. The commonest grasses there are; *Cynodon dactylon; Cenchrus biflorus* and *Dicanthium annulatum.* In addition to these there are several annual or perennial herbs such as, *Oxalis corniculata* & *Erigeron linifolium.*

It has been observed that the basal mycelial cords frequently penetrate the dead roots of grasses and are more or less perennial. *Gastrosporium simplex* was found at the base of *Cynodon dactylon;* the older and large fruitbodies were growing round the roots while the basal mycelial cords were penetrating the dead roots. It appears probable that the plant is not uncommon in the drier parts of the plains and has so far escaped notice due to its subterraneum habitat.

From its occurance in the Panjab plain which has a different type of vegetation and climate it appears quite reasonable to assume that Pilat has too much exaggerated the presence of the fungus in a typical plant association and also its use in serving as an ecological indicator. It may be true in a particular locality but cannot be generalized for all climates and countries.

A new species of Geastrum.

Geastrum panjabense Ahmad sp. nov.

Sporophore hypogeous, the button globose or sub-globose, becoming superficial and expanded at maturity, 5—10 cm. across, attached at the base by a well developed rhizomorphic strand. Exoperidium split to about the middle into 5—12 rays, strongly hygroscopic, acute, fleshy layer pale brown, adnate, rarely rimose, exterior covered with sand particles held by the persistent, thin strongly adnate mycelial layer, base convex with a prominent umblical scar. Endoperidium sessile, globose or sub-globose, 5—26 mm. in diameter, bay brown bleaching to dirty white on long exposure to sun, enclosed by the saccate base of the exoperidium; peristome fibrillose sometimes seated in a depressed area, rarely a naked aperture. Gleba ferruginous or snuff brown columella absent; spores globose or subglobose 4—8.8 μ (very variable in shape and size, some oval 4.5 ⇌ 9.5 μ); epispore yellowish to snuff brown, smooth.

*) Farlowia, III., p. 225—267, 1947.

Habitat: Solitary or in groups in open sandy deserts covered with *Eleusine flagellifera.* Very common.

Locality: Panjab: Ladhar, Sheikhupura, Sep. 10, 1941, no. 319; August 15, 1942, no. 585; Sep. 25, 1942, no. 644; August 4, 1944, no. 1501; August 20, 1944, no. 1503; Sep. 14, 1944, no. 1505. Shorkot, July 1938, no. 316.

Primum hypogaeum, globosum vel subglobosum, mox erumpens, postea superficiale, 5—10 cm. diam., basi fibris rhizomorphoideis plus minusve numerosis praeditum; exoperidium in maturitate explanatum, usque ad medium in lacinias 5—12 valde hygroscopicas, acutas fissum; strato interiore carnoso, pallide brunneo, adnato, raro rimoso, strato exteriore granulis arenae numerosis fibrisque mycelicis contextis obtecto, basi convexa, manifeste umbilicata; endoperidium sessile, globosum vel subglobosum, 5—26 mm. diam., primum badium, postea expallescens, sordide albescens, exoperidii basi saccata inclusum; peristomium fibrillosum, interdum in area depressa situm; gleba ferruginea vel obscure brunnea; columella non evoluta; sporae quoad formam et magnitudinem variabilissimae, globosae vel subglobosae, 4—8.8 μ, interdum ovoideae, 4.5 ⇌ 9.5 μ; episporium luteolum vel obscure brunneum, leve.

A very common xerophytic species found in the sandy deserts of the Panjab plains. The buttons resemble those of *Tulostoma vulgare* and *T. evanescens* which abound in the same habitat. In habit and habitat it resembles *G. xerophilum* Long which, however, differs in the sulcate mouth and the spores. It is a small elegant species characterized by the globose, sessile sporocarp, fibrillose peristome, strongly hygroscopic exoperidium absence of columella, and very large spores. In some specimens the mouth is an indefinite aperture.

Miscellaneous notes.

Rhizopogon roseolus (Corda) Hollos.

Sporophore epigeous or semi-hypogeous, subglobose 1.2—2 cm. in diameter; white when fresh becoming avellaneous (R) when dry; fibrils only conspicuous at the base. Peridium 200—230 μ thick, the outer part naples yellow (R) while the inner rosy salmon; not changing colour in KOH. Gleba white when fresh drying to light buff or warm buff (R), not changing colour when cut; cavities 2—5 to a mm., septa 45—60 μ thick of much gelatinized hyphae. Spores elliptic, some slightly curved, smooth, hyaline, 2.5—3.5 ⇌ 6.5—8.5 μ.

On the ground. Murree; Changla gali; Shogran, Kagan Valley. Fairly common.

Myriostoma coliforme (Dicks. ex Pers.) Corda.

On the ground Chandra Valley, Himalayas, leg. Prof. S. R. Kashyap, 2 specimens in Herb. Panjab University Lahore.

Montagnites arenarius (DC.) Morse, Mycologia XL. p. 256. 1948. *M. Candollei* Fr., Epicrisis, p. 241, 1836; *M. radiosus* (Pall.) Hollos Gast. Ungarns p. 30, 1904; *Montagnea arenaria* (DC.) Zeller Mycologia XXXV. p. 418, 1943.

A very common species found through out the sandy deserts and cultivated fields. This may be easily recognised by its *Coprinus*-like appearance, lamellate non deliquescent gleba absence of pileus tissue and a long woody stipe enclosed in a volva at the base.

Disciseda pedicellata (Morgan) Hollos in Termesz. Fuztek p. 103, 1902; Hedwigia XLIII, p. 22, 1903.

Syn. *Catastoma pedicellatum* Morgan in Jour. Cincinnati Soc. Nat. Hist. XIV. p. 143, 1892.

Habitat: Hypogeal, in rich humus under thick growth of *Acacia arabica* on the sides of a pond.

Locality: Rohtak, Nov. 20, 1944, leg. S. Ahmad.

This species may be easily distinguished from *D. cervina* the only other species of the genus recorded from India in having larger pedicellate spores. In the Panjab plains the two are further marked by their habitat, one growing in rich humus soil under shade and the other in open sandy deserts.

Cyathus Colensoi Berk. Fl. N. Z. II. p. 192, 1855.

Habitat: On the ground, in a forest with thick undergrowth.

Locality: Simla, 7000 ft., July 1943, leg. S. Ahmad.