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GLOMALEAN SPORE FLORA OF PAKISTAN III. SPORES FORMED FREELY IN SOIL AGGREGATES

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ABSTRACT

Glomalean spores were isolated from the soil of a fallow wheat field by direct soil paste method. These spores in the soil aggregates were formed without any connection with some organic matter or living host. Seventeen species of *Glomus*, three of *Scutellospora* and one species each of *Gigaspora*, *Acaulospora* and *Sclerocystis* were recorded.

Key words: Soil aggregates, glomalean spores, Pakistan

INTRODUCTION

There is an ample evidence on differential effects of Zygomycetous vesicular-arbuscular mycorrhizal fungi on host. (Trappe, 1982). The propagules formed by these fungi for propagation (Hayman, 1975) are found in diverse habitats i.e. from stable plant communities to highly disturbed ones (Graw, 1979; Mosse *et al*., 1981). These different arbuscular mycorrhizal fungi may affect a host differently in the same environment. With changing environments many sorts of interactions may occur. For a sound interpretation of results a researcher need to know which fungi are involved in the experiments (Trappe, 1982).

In the present study the list of the Endogonaceous spores from Pakistan has been extended. The spores are recorded which are formed freely in the soil/ soil aggregates without any base in the host plant/ decayed or moribund root pieces (Nasim, 1991; Nasim and Iqbal, 1991).

MATERIALS AND METHODS

The soil samples were brought in plastic bags from a fellow field near Botanical Garden, Punjab University, Quaid-e-Azam Campus, Lahore in May,1998. About 10 grams of the soil was made into a very thin paste. The hyphal masses from the soil were picked up with the help of a sharpened toothpick while observing carefully through a binocular microscope. Glass dropper blocked with a cotton plug was also used to suck the spores /soil aggregates. The soil aggregates were gently crushed with the help of a small spatula and washed with cotton blue stain (0.05% trypan blue in phenol, lactic acid and glycerine in 1:1:1 ratio) while observing through the light microscope. The spores with hyphal masses were passed through various grades of alcohol and were put in a drop of canda balsam to prepare permanent slides. Spores were identified with the help of Keys by Hall (1984), Trappe (1982) and Morton (1988).

RESULTS AND DISCUSSION

Arbuscular mycorrhizae are the most abundant and wide spread in the roots of many Angiosperms, Gymnosperms, Pteridophytes and Thallophytes (Mosse *et al.*, 1981; Iqbal *et al.*, 1988a,b,c). These fungal symbionts are ubiquitous soil inhabitants which must colonise plant roots to grow and reproduce. They have been found in diverse habitats (Graw, 1979; Mosse *et al*., 1981).

Spores of AM fungi are arranged in loosely formed clusters randomly dispersed in a loose or dense hyphal network (Plates 2 & 5) or highly ordered around a hyphal plexus have been listed. Ectocarpic spores formed singly on hyphae have also been recorded (**Fig.1-4**) (Rothwell and Victor, 1984). The aggregation of spores is more likely a response to the physical environment than to inherent genetic mechanism (Morton, 1988).

This study reports the presence of seventeen species of *Glomus* (*G. albidum* Walker & Rhodes, *G. caledonicum* (Nicol. & Gerd.) Trappe & Gerd., *G. claroideum* Schenck & Smith, *G. convolutum* Gerd. & Trappe, *G. deserticola* Trappe et al., *G. fasciculatum* (Thaxture) Gerd. Trappe emend Walker & Koske, *G. geosporum* (Nicol. & Gerd.) Walker, *G. macrocarpum* Tul. & Tul., *G. mosseae* (Nicol. & Gerd.) Gerd. and Trappe, *G. pansihalos* Berch and Koske, *G. versiforme* Karsten Berch, *G. tortuosum* Schenck & Smith, and four unidentified *Glomus* species), three species of Scutellospora (*S. calopspora* (Nicol. & Gerd.) Walker & Sanders, *S. corelloidea* Trappe et al., *S. pellucida* (Nicol. &

Schenck) Walker & Sanders), one species each of *Gigaspora* (*G. dicipiense* Hall & Abbott), *Acaulospora* (*A. bireticulata* Rothwell & Trappe) and *Sclerocystis* (*S. pakistanica* Iqbal & Bushra) in the soil and soil aggregates.

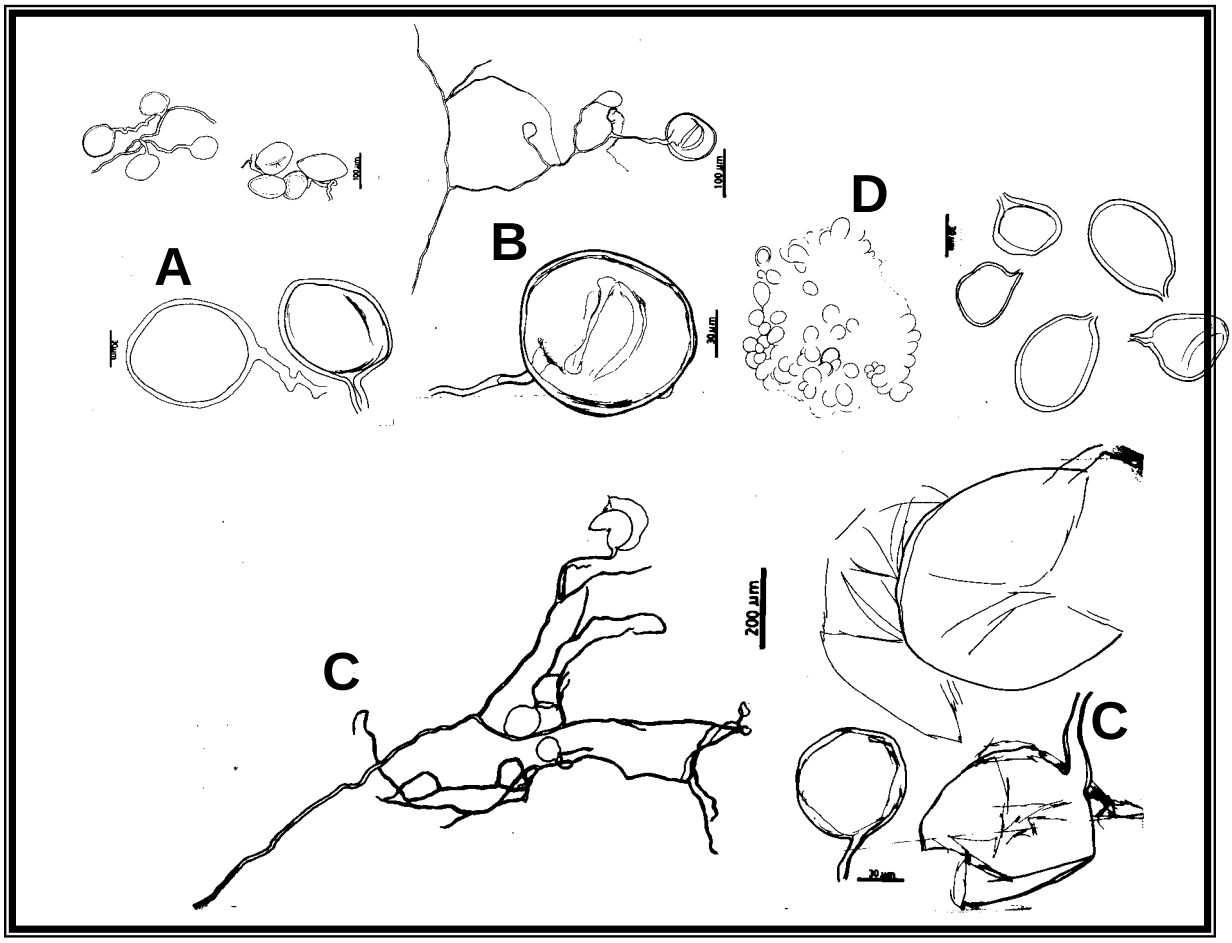

Fig. 1. Spores formed freely in soil aggregates. A: *Glomus mosseae*; B: *Glomus monosporum;* C: *Glomus caledonicum*; D: *Glomus convulatum.*

The dominance of the genus *Glomus* indicates the influence of the soil or the effect of plant type as observed by Schenck and Kinlock, (1976). In this work the spores are reported which are formed freely in the soil or in soil aggregates probably imparting stability to them.

Pakistan is an agricultural country. The application of mycorrhizal research to the improvement of crop productivity in Pakistan will succeed only if fungi that are right for the crop and the environment are listed and selected with appropriate sophistication.

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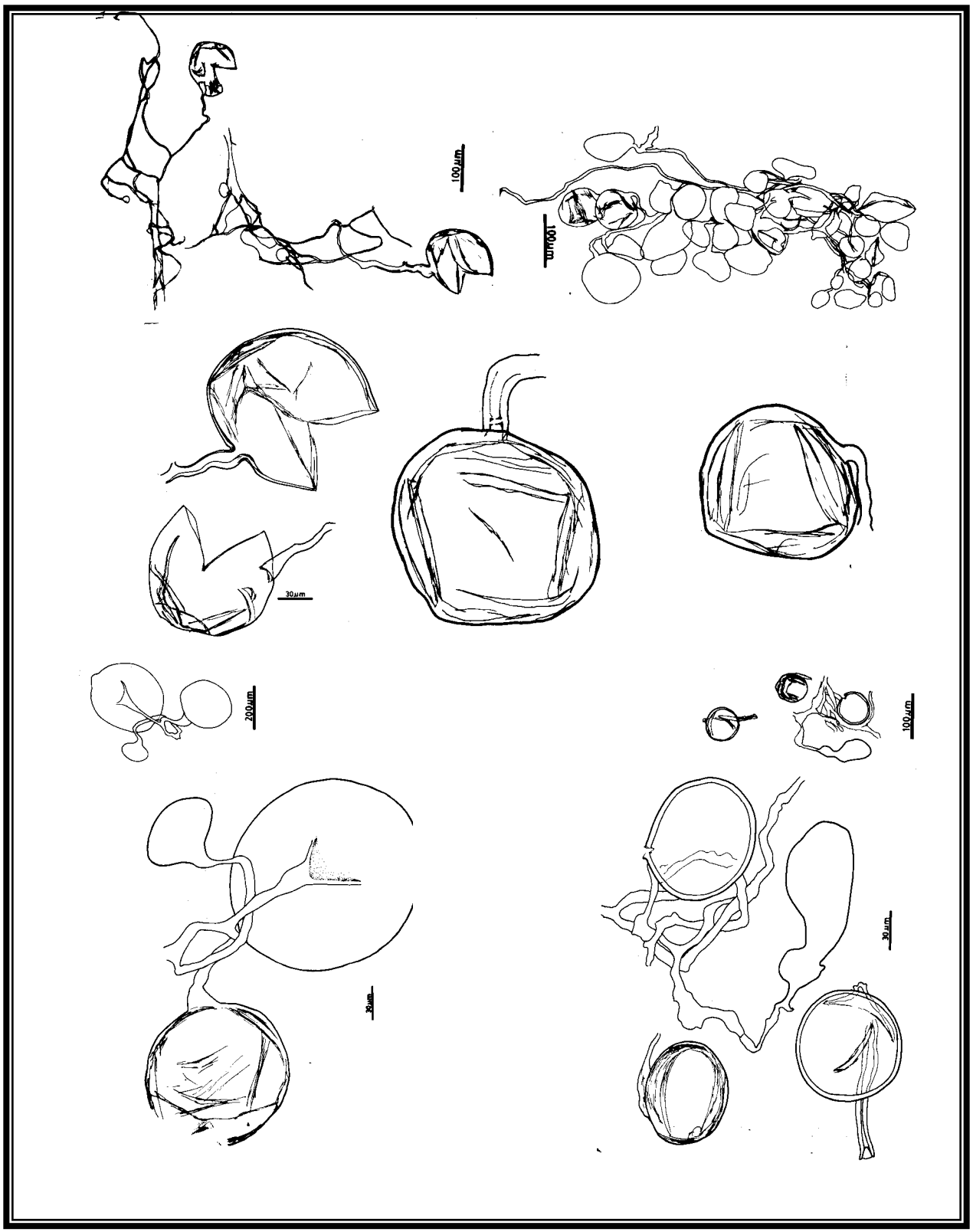

Fig. 2. Spores formed freely in soil aggregates. A: *Scutellospora callospora*; B: *Gigaspora decipiens; C: Glomus macrocarpum: D: Glomus claroideum.*

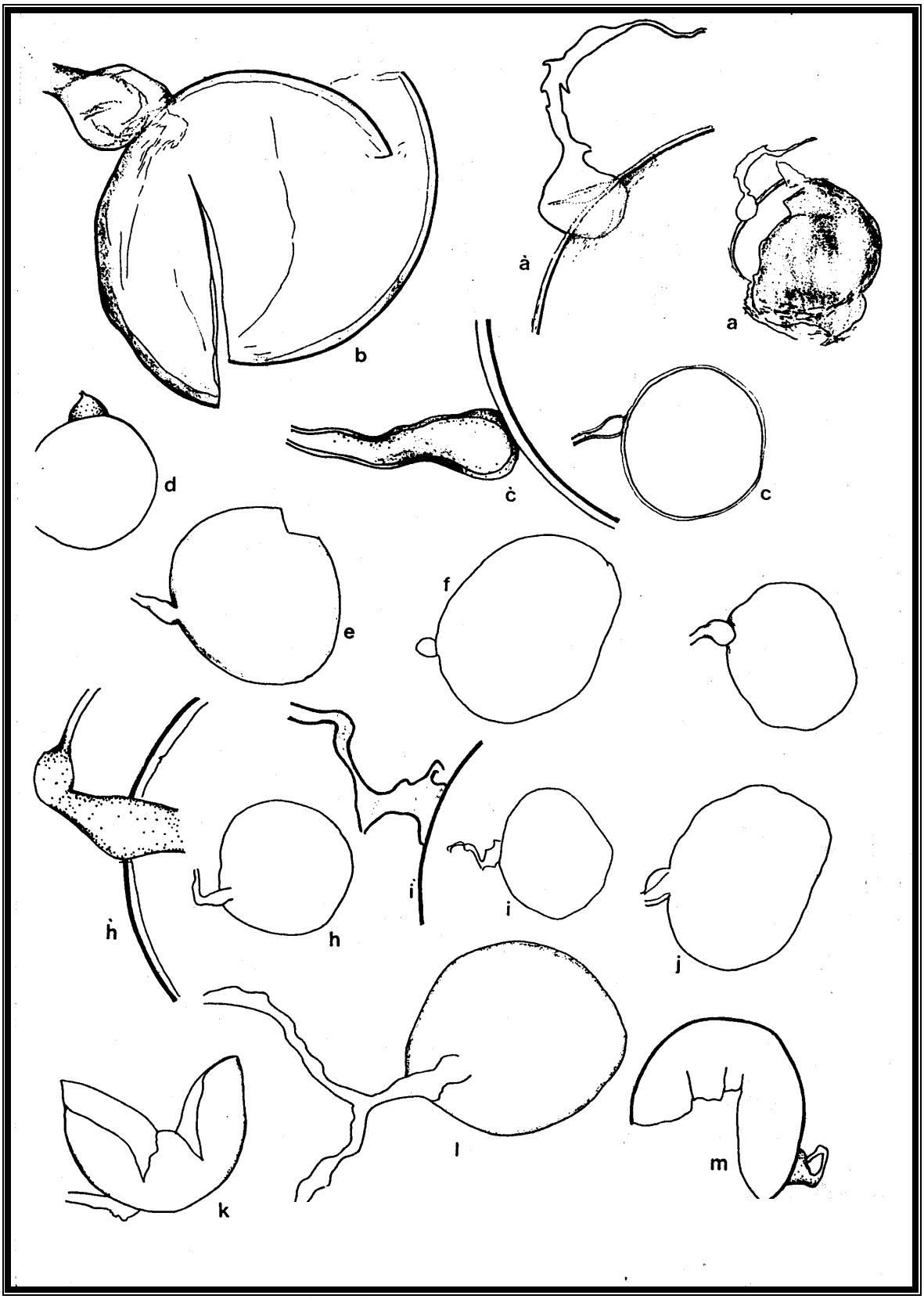

Fig.3. Spores formed freely in soil aggregates

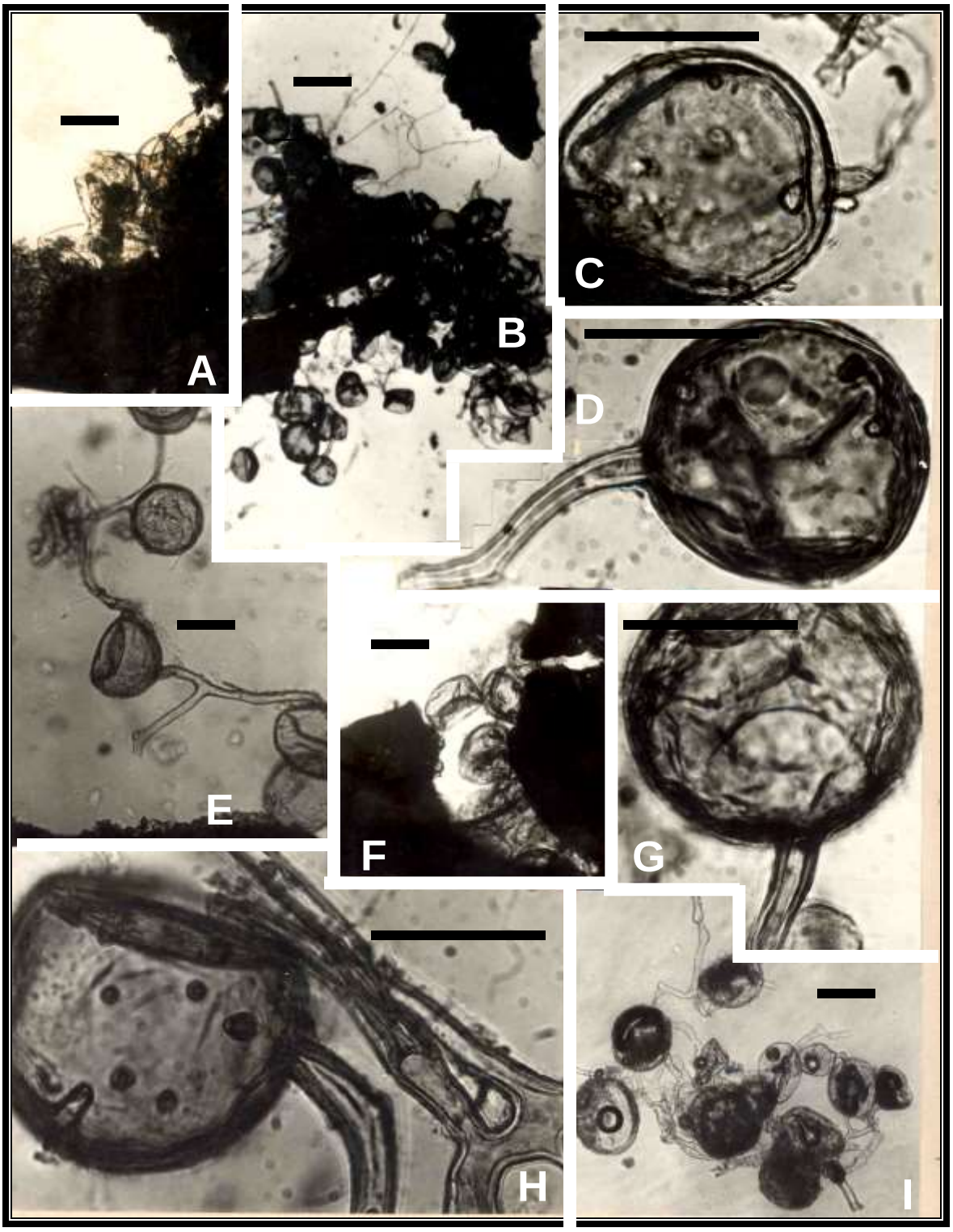

Fig. 4. A: *Glomus fasciculatum*; **B-I:** *Glomus deserticola* isolated from soil aggregates (bar=50μm).

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