Plant Pathologists (ed. D. S. Ingram & J. P. Helgeson), pp. 173–178. Oxford: Blackwells Scientific Publications.

MOLINA, R. & TRAPPE, J. M. (1982). Patterns of ectomycorrhizal specificity and potential among pacific northwest conifers and fungi. *Forest Science* **28**, 423–458.

TOWNSEND, B. B. & WILLETTS, H. J. (1954). The development of the sclerotia of certain fungi. *Transactions of the British Mycological Society* **37**, 213–221.

A NEW SPECIES OF *HETEROCEPHALUM* FROM IVORY COAST SOIL

BY A. M. PERSIANI AND O. MAGGI

Dipartimento di Biologia Vegetale, Università 'La Sapienza', Largo Cristina di Svezia 24, 00165 Rome, Italy

Heterocephalum taiense sp.nov. is described from a culture obtained from forest soil of the Tai National Park, Ivory Coast. It is compared with *H. aurantiacum*, from which it differs in colour of conidial heads and other features.

During research on tropical soils in the Tai project: 'Effects of increasing human activities on south western Ivory Coast forest', UNESCO, MAB Programme, project no. 1, we isolated in Dec. 1978, Jan. 1980 and Mar. 1984 an interesting Hyphomycete belonging to the genus *Heterocephalum* Thaxter. It has already been reported as *Heterocephalum* sp. no. 1 (Maggi & Persiani, 1983).

Heterocephalum was erected by Thaxter (1903) with the type species *H. aurantiacum*, the description of which is based upon two cultures isolated from toad and goat dung, collected respectively in Jamaica and the Philippines. Subsequently Raper & Fennell (1952) reported a new record of *H. aurantiacum* from Liberian soil and in discussing the systematic position of this genus confirmed the observations of Thaxter.

H. aurantiacum was also isolated, from soil from the Barro Colorado Islands, by Farrow (1954); she described her strain as 'bright yellow' in colour; this is an atypical characteristic for the species. Meyer (1959) recorded it in soil from the former Belgian Congo, and Indoh & Oyatsu (1965) from cockroach dung collected in Okinawa.

The fungus was described by Thaxter and also considered by Morris (1963) and Barron (1968) as an atypical member of the Stilbellaceae. However, it does not have conidiophores arranged in fascicles like synnematous fungi; instead the entire conidiogenous apparatus develops from a single fertile hypha, as it does in *Aspergillus*; the presence of corticating sterile hyphae along the fertile one gives rise to this misunderstanding.

The strain, here described as *H. taiense* sp.nov., shows the same developmental stages as the type species. In the first stage of development, sterile corticating hyphae from the mycelium differentiate and grow over the swelling vesicle, between the young conidiogenous cells. Corticating hyphae subsequently form external radiating setae, enlarging at maturity, in an apical vesicle which produces mucilaginous substances; they probably have an adhesive function of some ecological significance. These radiating setae begin to branch, laterally forming a net-like envelope completely enclosing the progressively developing head. This hyphal tangle contains the conidial mass and prevents spore release. Echinulations of the hyphae show under optical microscopy when the conidial heads of *H. taiense* are mounted in H_2O or coloured in Alcian Blue. Corticating hyphae appear decidedly encrusted. Also *H. aurantiacum*, ATCC no. 16328 shows, under the same conditions, the same characteristic as described by Thaxter for his strain. *H. taiense*, like the type species, has a conidiogenous apparatus organized in four or five orders of branches, so it is much more complex than in *Aspergillus*.

Heterocephalum taiense sp.nov. (Figs 1–3)

Etym. Tai National Park, Ivory Coast et *-ense* geogr. suff.

Coloniae in PDA effusae, 2·3 cm diam 7 diebus, 5 cm diam 14 diebus, 24 °C crescentes; mycelium primum immersum, deinde floccosum, album, e substrato, in valde distantibus ab eodem centro descriptis aeris, per 3–4 dies candida, deinde flava (R., tabula XVI) densa capitula conidica producens; reverso leviter flavo, aetate leviter brunneo, exudato non multo, claro. Hyphae septatae, ramosae, hyalinae, 1·8–2·5 μm latae. Capitula conidica e substrato formata, radiata, vesicula, conidiogeno apparatu, conidiis atque hypharum glomerulo composita; mensura variabili, fere 400 μm maturitate, usque ad 500 μm diam; ex capitulis numerosae, septatae, rectae, rigidae, radiatae, in apice dilatatae, setae orientes, 400–1000 μm longae. Conidiophora sicut rami perpendiculares ex hyphis vegetativis orientia, plerumque vero pede praedita, aseptata, sine colore, parietibus crassis, laevia, variabilia, 11–15 μm diam, usque ad 20 μm in media parte lata, 450–1000 μm longa, plerumque attenuata in basi atque sub vesicula; parallelis atque sterilibus

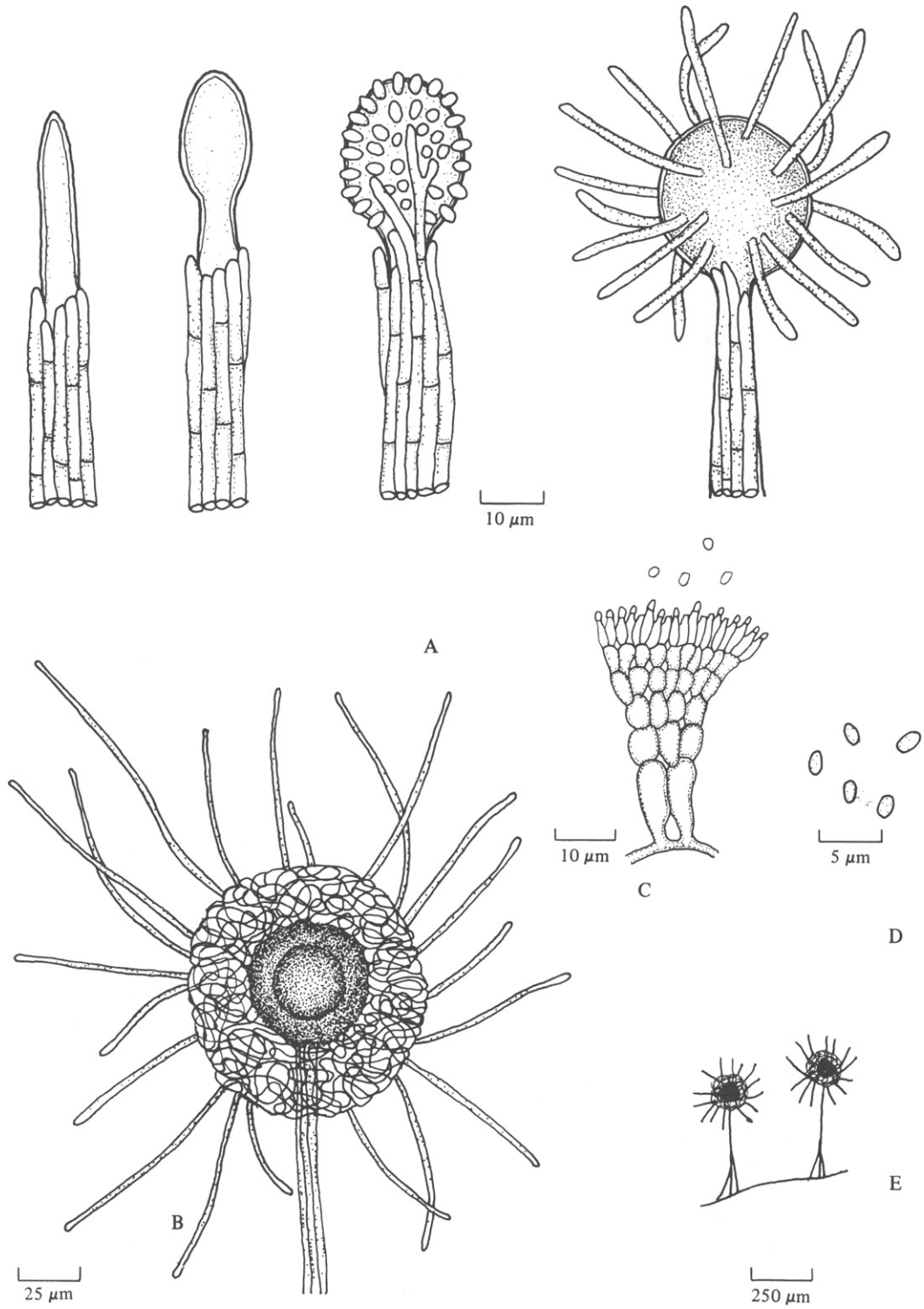

Fig. 1. *Heterocephalum taiense*. (A, B) Development of the conidiophore; (C) portion of mature head showing series of branches and conidiogenous cells; (D) conidia; (E) habit.

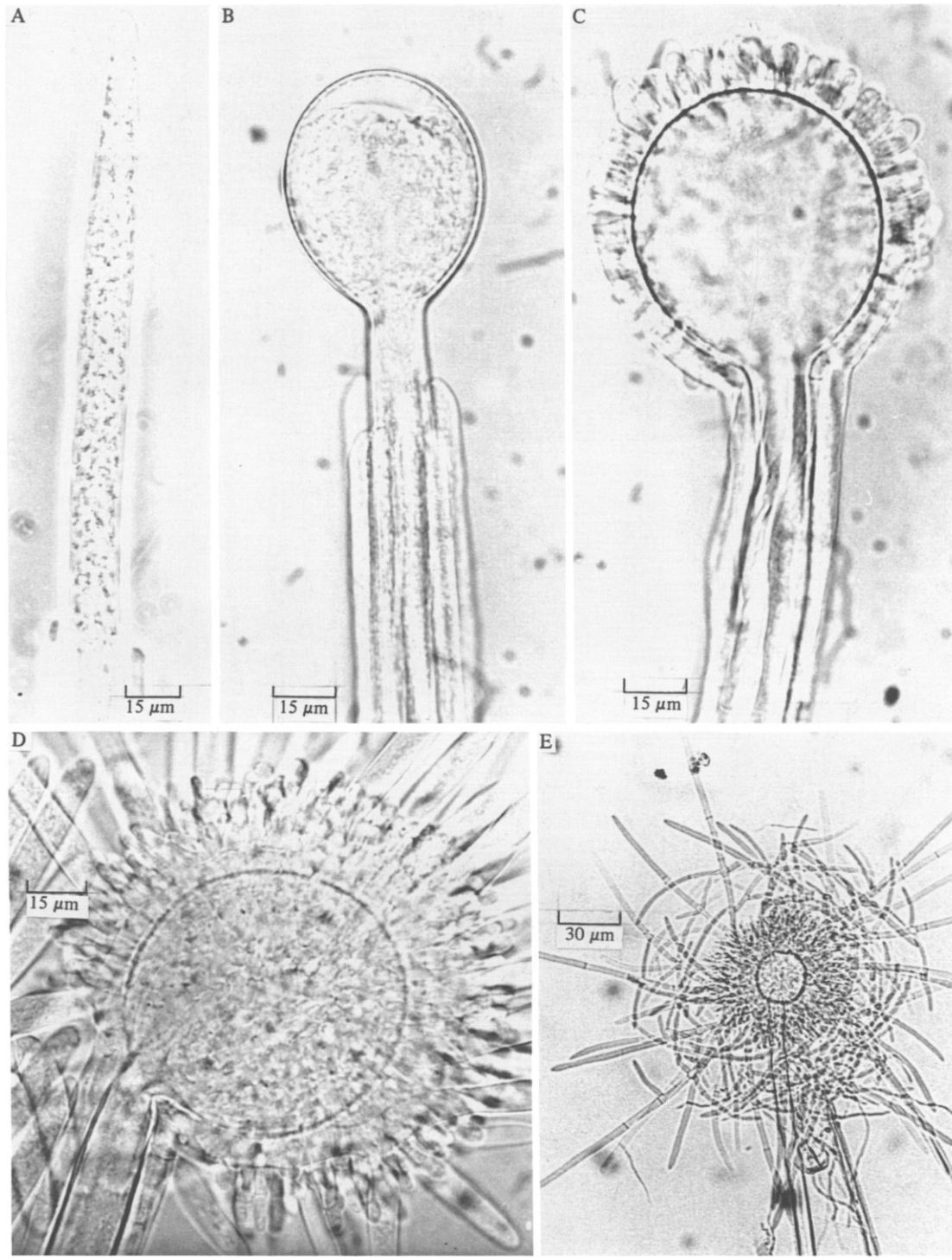

Fig. 2. *Heterocephalum taiense*. (A, B, C) Early stages of development showing origin of vesicle and advancing envelope of corticating hyphae; (D, E) more advanced stages: radiating setae and net-like envelope.

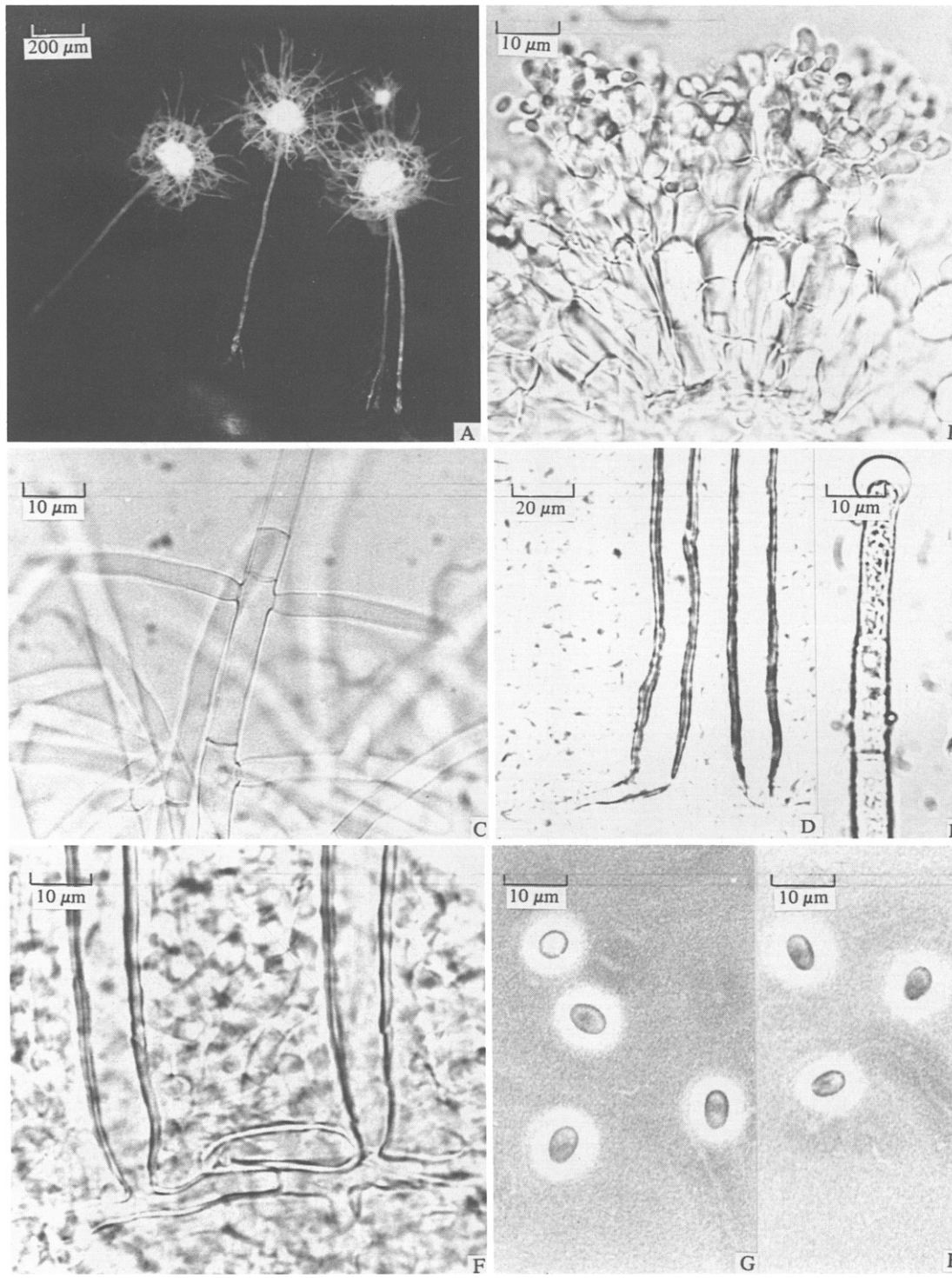

Fig. 3. *Heterocephalum taiense*. (A) Habit; (B) portion of head showing series of branches, conidiogenous cells and conidia; (C) branches of the radiating setae; (D, F) foot of conidiophores; (E) tip of a mature seta; (G, H) conidia.

hyphis (quinque usque ad decem fere) e mycelio orientibus, simul concrescentibus, 3·6–6·4 μm latis, circumdata, ut plus minusve continuum involucrum, infra apicem augentis conidiophori, fiant, deinde super turgescentem vesiculam augescentibus atque radiate diffundentibus, sicut setis, praeterea supra conidia perpendiculari in ramos exitentibus, 4·0–5·5 μm diam. Vesiculae primum leviter elongatae usque ad subglobosas, maturitate globosae, circa 30–80 μm, plerumque 40–50 μm diam, parietibus crassis, fertiles in tota superficie, concolores conidiophoro, apparatum conidiogenum ferentes, plerumque quater vel quinquies ramosae: prima series ramorum 19–30 × 5·5–10·5 μm secunda series ramorum 5·5–10·5 × 8–9 μm tertia series ramorum 4·5–9 × 6·5–7·5 μm, quarta series ramorum 3·5–8 × 5·5–7·5 μm, quinta series ramorum 7–8 × 3–4 μm cellulas conidiogenas ferens. Cellulae conidiogenae monophialidicae, lageniformes, 6·2–7·2 × 2·6–3·7 μm, brevi collo praeditae. Conidia copiosa, adhaerentia capitulis hyalina, pallide subflava in massa, laevia, 0-septata, ovalia usque ad oblonga-elliptica, 3·6–5·4 × 2·3–3·2 μm.

Habitat: e solo silvestri, Tai, Ora Eboris. Holotypus: ROHB 109 S.

Colonies on potato dextrose agar, effuse, at 24°, 2·3 cm diam after a week, 5 cm diam after 14 days, basal mycelium at first submerged, then flocculent, white, with a concentric production of white to primuline yellow (Ridgway, pl. XVI, 1912) conidial heads, separated by relatively small spaces; reverse pale yellow to light brown with age; exudate very limited, clear. *Hyphae* septate, hyaline, 1·8–2·5 μm diam. *Conidial heads* arising from the substrate, radiate, consisting of vesicle, conidiogenous apparatus, conidia, all included in a spherical hyphal envelope; variable in size, mostly 400 μm, at maturity up to 500 μm diam; from the head several septate, straight, rigid, radiating setae differentiate, 400–1000 μm in length slightly inflated at the apex. *Conidiophores* arising as perpendicular branches from septate vegetative hyphae, usually with a true foot, aseptate, with thick walls, smooth, variable in size, 11–15 μm diam, up to 20 μm at the median level, 450–900 μm in length; usually constricted at the base and just below the vesicle; surrounded by parallel sterile hyphae originating from the mycelium, 3·6–6·4 μm diam (about six to ten in number) and developing together to form a more or less continuous envelope except at the apex of the growing conidiophore. The hyphae grow on the swelling vesicle; later they radiate externally, giving rise subsequently, beyond the conidia, to perpendicularly and symmetrically branching bristle-like hyphae, 4–5·5 μm diam. *Vesicles* at first slightly elongate to subglobose, at maturity globose, mostly 40–50 μm diam but ranging from 30 to 80 μm, thick-walled, typically fertile over the surface, coloured like the conidiophore, bearing the conidiogenous apparatus, branched four to five times: first series of branches 19–30 × 5·5–10·5 μm, second series 5·5–10·5 × 8–9 μm, third series 4·5–9 × 6·5–7·5 μm, fourth series 3·5–8 × 5·5–7·5 μm, fifth series 7–8 × 3–4 μm, terminating in a cluster of conidiogenous cells. *Conidiogenous cells* monophialidic, lageniform, 6·2–7·2 × 2·6–3·7 μm with a short neck. *Conidia* very abundant, remaining on the conidial heads, smooth, hyaline, slightly yellow in mass, 0-septate, produced in mucous mass, from oval to oblong–elliptical, 3·6–5·4 × 2·3–3·2 μm.

H. taiense, although showing the same general appearance and structural characteristics of *H. aurantiacum*, is dissimilar in the colour of the conidial heads and in the shape and size of other structures. *H. taiense* is characterized by a shorter conidiophore and a smaller conidial head, the vesicle and series of branches being shorter than in *H. aurantiacum*. Moreover the early vesicles also differ in shape. The ratio between length and width in the conidia of *H. taiense* is 1·6, while in *H. aurantiacum* it is 1·1. *H. taiense* generally presents a more differentiated foot cell and the bristle-like hyphae are perpendicularly branched, whereas in *H. aurantiacum* they branch at an angle of 45°.

H. taiense has been maintained in culture for 6 years and never produced a teleomorphic state.

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REFERENCES

BARRON, J. L. (1968). *The Genera of Hyphomycetes from Soil*. Baltimore: Williams & Wilkins.

FARROW, W. M. (1954). Tropical soil fungi. *Mycologia* **46**, 632–646.

INDOH, H. & OYATSU, A. (1965). On *Heterocephalum aurantiacum* Thaxter, newly found in Okinawa. *Transactions of the Mycological Society of Japan* **5**, 79–82.

MAGGI, O. & PERSIANI, A. M. (1983). Mycological studies of the soil. In 'Comparative Studies on Microfungi in Tropical Ecosystems'. MAB–UNESCO.

MEYER, J. A. (1959). Moisissures du sol et des litières de la region de Yangambi (Congo Belge). *Publications de l'Institut national pour l'étude agronomique du Congo Belge, sér. sci.* **75**, 1–211.

MORRIS, E. F. (1963). The synnematous genera of the Fungi Imperfecti. *Western Illinois University, Biological Science Publication* No. 3.

RAPER, K. B. & FENNELL, D. I. (1952). Two noteworthy fungi from Liberian soil. *American Journal of Botany* **39**, 79–86.

RIDGWAY, R. (1912). *Color Standards and Color Nomenclature*. Washington, D.C.: published by the author.

THAXTER, R. (1903). New or peculiar North American Hyphomycetes. III. *Botanical Gazette* **35**, 153–159.