

SHORT SCIENTIFIC NOTES

Titanium Molybdate and its Properties

The similarity in ionic size¹ of Ti^{4+} (0.68 Å) and Mo^{6+} (0.62 Å) and the fact that the oxides TiO_2 and MoO_3 have different crystallographic structures, TiO_2 crystallising² with the tetragonal $D_{4h}^{14} - P4/mnm$ ($a_T = 4.594$ Å and $c_T = 2.958$ Å) and MoO_3 with the orthorhombic ($a_0 = 3.962$ Å, $b_0 = 13.858$ Å, $c_0 = 3.697$ Å) structure³, led us to investigate if these two oxides formed a continuous series of solid solutions. The interaction of TiO_2 and MoO_3 was studied by the high temperature solid state reaction of the pure oxides (BDH grade, purity better than 99%) at 650° C. Formation of a compound Ti_2MoO_8 ($\text{TiO}_2 : \text{MoO}_3 = 1 : 2$) with orthorhombic structure ($a_0 = 4.2$ Å, $b_0 = 13.56$ Å and $c_0 = 3.23$ Å) was confirmed in the X-ray powder photograph taken on a 14 cm Debye Scherrer camera with MoK_α radiation filtered through Zr foil. [The compound melted incongruently at 1050° C and decomposed into TiO_2 and MoO_3 at this temperature.] This was followed by X-ray powder photographs of the decomposition products obtained by heating Ti_2MoO_8 at different temperatures.

Dept. of Physical and Solid State Chemistry,
Miss R. KRISHNAMURTHY,
V. S. CHINCHOLKAR.

Institute of Science, Nagpur,
September 11, 1971.

1. Ahrens, L. H., *Geochim. et Coschim. Acta*, 1952, 2, 155.
2. Huggins, S., *Phys. Rev.*, 1926, 27, 638.
3. Swanson and Fayat, *NBS Circular*, 1953, 3, No. 539.

The Polymorphic Modifications of Dioctahedral Micaceous in the Clay Deposit of Golihalli, Belgaum District, Mysore State

Clay associated with shales occurs in the vicinity of Golihalli (Lat. 15° 32' N; Long. 74° 39' E). The clay shows laminations which merge with and continue in the shales.

X-ray analyses were carried out on the clay and shale. The reflections (020) = 4.428 Å and (002) = 3.559 Å indicate the presence of crystallographically well-ordered kaolinite. The presence of dioctahedral mica is evidenced by the reflection $d(060) = 1.496$ Å whose b_0 parameter is 8.97 Å. The presence of $2M_1$ type

is indicated by the reflections of the type hkl , i.e., (023), (114) and (114) answering the values 3.731 and 3.715 Å; 3.513 and 3.507 Å and 3.198 and 3.192 Å while 1M is indicated by (112) and (112) of the values 3.648; 3.609 and 3.058 Å.

Levinson (1955) is of the opinion that $2M_1$ is present in sediments whereas 1M is found in non-sediments. The occurrence of two polymorphic modifications of mica as mechanical mixtures in the clay and shale under study reveals that two different minerals have built up these sediments. The $2M_1$ which is more abundant has derived from muscovite under sedimentary conditions whereas the less abundant 1M has derived from the alteration of feldspars either before or after its deposition in the sedimentary basin.

The fact that the laminations in the clay continue into the shales indicates the possibility of the clay being deposited together with the shales. It appears that the shales underwent bleaching and lost their red colour giving rise to clay. Artificial bleaching experiments conducted on the unbleached shales result clay of similar colour and brightness. Therefore, it could be concluded that the bleaching of the shales has resulted in clay deposits without destroying whatsoever the laminations and the minerals of the shales.

The authors thank Ing. B. Adamus, Department of Mineral Resources, Mining University, Ostrava, Czechoslovakia, for the X-ray diffraction of the shale and clay.

Dept. of Geology, B. SOMASEKAR.
Karnatak University, B. S. MACHIGAD.
Dharwar, October 10, 1971.

1. Levinson, A. A., "Studies in mica group: Polymorphism among illites and hydrous micas," *Am. Min.*, 1955, 40, 41.

An Unusual Frenulum of *Pycnarmon cribrata* Fab. (Lepidoptera: Pyralidoidea)

The wing coupling apparatus in the Superfamily Pyralidoidea comprises of a long frenulum on the hind wing which engages with the retinaculum consisting of a group of bristles at the base of the cubitus on the ventral side of the forewing. A study of 43 species of Pyralid moths has shown that the frenulum

of the male is constituted by a single, long, spine-like tapering process, whereas in the female the number of frenular spines varies from two to five. The family Phycitidae is, however, characterised by the presence of a single frenular spine in both the sexes.

Generally speaking, the shape of the frenulum in the males of different species is more or less similar. The frenulum of the male of *Pycnarmon cribrata*, on the other hand, is uniquely distinct from all the other species. The tip of the frenulum in this species is swollen to form a well-developed head which gives the appearance of a capitate frenulum as compared to the setaceous form of the frenulum in all the other species. Several males of this species that have been studied have the same type of frenulum which shows that the atypical structure of the frenulum is not met with in one or two individuals but it is a common character of the species. There seems to be no report so far of such a capitate frenulum in this species.

Dept. of Zoology,
Panjab University,
Chandigarh, October 19, 1971.

H. R. PAJANI.
H. S. ROSE.

Record of a Coreid Bug (Nut Crinkler) as a New Pest of Coconut in India

Reports were received as early as 1961 from different parts in Kerala on the shedding of immature coconuts which presented characteristic cracks and gummosis. Recently, nymphs and adults of a coreid bug were observed in association with such nuts in a garden adjacent to this research institute. In the laboratory, these bugs fed on female flowers (buttons) and immature nuts. The feeding punctures produced just below the perianth developed into necrotic lesions, which left permanent somewhat deep furrows or crinkles with gummosis. In the field, four nymphs of the bug caged with muslin cloth bag on inflorescence had fed on all the 21 one month old buttons and caused their shedding. In a bunch, those buttons which escaped shedding in spite of the attack by the bug developed into under-sized or barren nuts.

These nut-crinklers with antennae black except for the white basal half of the terminal joint, are reddish-brown above, pale beneath. Adults measure 1.7 to 1.9 cm long and 0.5 to 0.6 cm wide at mesothorax. Nymphs are dark reddish-brown with two black spots on the dorsal aspect of abdomen, at the centre, one

behind the other. They are provisionally identified as *Amblypelta* sp. *A. cocophaga* China is reported causing the same type of damage in Solomon Islands (Phillips, 1940¹; O'Connor, 1950²). Brown (1955)³ and Vanderplank (1958)⁴ reported a similar bug *Pseudotheraptus wayi* Brown as a serious pest of coconut palm in East Africa, Zanzibar and neighbouring Islands, causing nearly identical loss to the crop. In India, we are reporting the pest for the first time.

Entomology Section,
Central Plantation Crops
Research Institute,
Regional Station,
Kayangulam, Ochira P.O.,
Kerala State, September 28, 1971.

CHANDY KURIAN.
G. B. PILLAI.
V. A. ABRAHAM.
K. MATHEN.

1. Phillips, J. S., *Bull. Ent. Res.*, 1940, **31**, 295.
2. O'Connor, B. A., *Agric. J. Fiji.*, 1950, **21**, 21.
3. Brown, E. S., *Bull. Ent. Res.*, 1955, **46**, 221.
4. Vanderplank, F. L., *Ibid.*, 1958, **49**, 559.

Occurrence of *Cnaphalocrocis medinalis* Guenee (Lepidoptera: Pyraustidae) on Ragi in Mysore

During July, August 1971, *Cnaphalocrocis medinalis* has been found as a minor pest of ragi at Malur, Chikkahalahalli, Kulumepalya; Doddaballapur and Hebbal in Mysore State. In most of the places ragi is grown as a rainfed crop in large area. The percentage of infestation on dry land ragi is 5.21, whereas on irrigated ragi it is 14.50. During this period mostly larval stages were observed on the crop and not on grasses. The larva has been noted to fold the leaf margins by bringing together and flattening the opposite edges by means of a silken thread. The length of the fold varies from one to one and a half inches. The larva not only folds the margins of a single leaf, but also it folds two or three leaves. The caterpillars are migratory in habit. The caterpillar fed in these folded portions of the leaves. The damaged portion of the blade turned whitish and finally dried.

The insect was observed on ragi crop for the first time and is becoming more common and polyphagous. This indicates the possibilities of its assuming the status of a serious pest on ragi also.

Division of Entomology, M. VISHAKANTAIAH.
Univ. of Agri. Sci., M. JAYARAMAIAH.
Bangalore-24, October 23, 1971.

A Monogenic Mutation Simulating Continuous Variation

Characters showing continuous variation are inherited in essentially the same manner as those showing Mendelian discrete classes^{1,2} and, contrary to the implications of earlier models³, there is yet no experimental evidence to show that the nature and organisation of the genetic material governing these two types of variation patterns are basically different⁴. Our observations during the past ten years on the range of phenotypic variation regarding flower-form generated in the progenies of an X-ray induced male-sterile mutant in *Cosmos* are relevant in this context.

The mutant under study was induced in a Chelsea variety of the ornamental plant *Cosmos bipinnatus* Cav. whose dry seeds were irradiated with an acute X-ray dose of 15 kR at an operating voltage of 50 kV⁵. This variety invariably produces 'single' type inflorescences characterised by a single whorl of eight sterile ray florets surrounding a bunch of hermaphrodite disc florets. The mutant produced pistillate flowers of the 'double' type having 5-8 additional whorl of rays which were male-sterile; all the hermaphrodite disc florets having been transformed into pistillate rays. A recombination analysis revealed that the mutant condition was inherited as a monogenic dominant trait.

An interesting observation was that the 'double' flower forms, recovered from pollination of the original male-sterile mutant by pollen of the 'single' type control plants, showed considerable interplant variation in this respect. This intra-class variation among the 'doubles', analysed very critically in subsequent generation formed a continuous spectrum rather than discrete and was found to depend on the varying degrees of development of the central rays. An analysis of the data accumulated over the past several years regarding breeding behaviour of various 'double' forms and their progeny tests has shown that, given the presence of the gene for the 'double' condition in a plant, numerous other genes seem to influence the expression of 'doubleness'. These genes, which may have major effects on some other characters, act as the modifying factors, with both *plus* and *minus* effects, and may be said to constitute the genetic background. By varying this modifier background, a continuous range of phenotypes has been produced showing thereby that some cases of apparent continuous variation may

arise through variable expressivity of typical Mendelian factors.

Indian Agricultural Research Institute,
Division of Genetics,
New Delhi-12. October 8, 1971.

R. S. RANA.

M. C. KHARNWAL.

1. Nilsson-Ehle, H., *Bot. Notiser.*, 1908, 61, 257.
2. East, E. M., *Amer. Natur.*, 1910, 44, 65.
3. Mather, K., *Caryologia*, 1954, 6 (Suppl. 1), 106.
4. Jain, H. K. and Jain, S. K., *Amer. Natur.*, 1961, 95, 385.
5. Rana, R. S., *Ph.D. Thesis*, I.A.R.I., New Delhi, 1962.

On the Southern Limits of *Tetracita squamosa rufotincta* (Pilsbry) (Cirripedia, Balanidae) Along the West Coast of India

It has been shown by Utinomi (1969) that the distribution of *Tetracita squamosa rufotincta* (Pilsbry), an intertidal sessile barnacle, extends from east coast of Africa (Lat. 12° S) to Strait of Hormuz of Iranian Gulf (Lat. 26° N). Its occurrence on Kathiawar Coast of India (Wagh and Bal, 1969) suggests the probability of its further southward dispersal along the west coast of India especially in context of the circulation of surface water in this area (Wagh, in press).

A careful search for the presence of these forms in the intertidal region of the Gulf of Cambay area, however, has not been successful. This sub-species has neither been observed at any of the localities of the Konkan Coast (Lat. 20° 05' N to 15° 25' N) visited for studying the distribution and abundance of intertidal sessile barnacles (Wagh, 1965). Hence, the obvious conclusion is that Veraval (Lat. 20° 54' N) situated on the northern side of Gulf of Cambay seems to be its southern limit on the west coast of India.

It is likely that the dispersal of these barnacles southward to Cambay might have been prevented because of the ecological conditions prevailing in gulf region. An account of its hydrobiological conditions (Rao et al., in press) suggests that the various ecological factors which seem to be of importance are high turbidity, low salinity and tidal currents. It is probable that these barnacles, well established in areas of high salinity (41.5‰) such as Red Sea (Ekman, 1967) might find the low salinity values (26.14‰) in the Gulf of Cambay detrimental for their development and perhaps even for survival. It is also possible that the high amount of inorganic suspended

matter (personal observation) might be depriving the nauplii larvae of their essential phytoplanktonic requirements. The probability of swift tidal currents, having speed of upto six knots (West Coast of India, Pilot, 1961) carrying the planktonic larvae away from the substrata suitable for their settlement cannot be ruled out. Similar phenomenon of tidal current affecting the faunistic features of a locality has been reported for Suez Canal by Fox (1926, 1929).

It can, therefore, be presumed that Gulf of Cambay prevents the further southward dispersal of these non-fouling barnacles and thereby acts as an ecological barrier.

National Institute of Oceanography,
Sassoon Docks,
Colaba, Bombay-5, October 14, 1971.

1. British Admiralty, *West Coast of India Pilot*, 10th Edn., Hydrographic Department, Admiralty, London, 1961.
2. Exman, S., *Zoogeography of the Sea*, Sidgwick and Jackson, London, 1967.
3. Fox, Munro, *Trans. Zool. Soc.*, London, 1926, 22, 1.
4. —, *Ibid.*, 1929, 22, 6.
5. Rao, T. S. S., Rao, K. K., Wagh, A. B. and Desai, B. N. (In press).
6. Utinomi, H., *Videnk. Meddr dansk naturh Foren*, 1969, 132, 79.
7. Wagh, A. B., *Ph.D. Thesis*, Universit of Bombay, 1965.
8. —, *J. Bombay Nat. Hist. Soc.* (In press)
9. — and Bal, D. V., *Curr. Sci.*, 1969, 38 (14), 344

Occurrence of Nepheline Syenites near Elchuru, Andhra Pradesh

In a reconnaissance field trip to the hill ranges in parts of Guntur and Ongole Districts, Andhra Pradesh, nepheline syenites and other related alkaline rock types were observed near Elchuru village ($16^{\circ} 04' 48''$ N and $79^{\circ} 55' 42''$ E; Survey of India topo-sheet 56 P/16), 13 miles south-west of Narasaraopet town. Three major hills (724, 820 and 637) and one minor hill, all occurring in an area of about 6 sq. miles around Elchuru, are essentially composed of these undersaturated feldspathoidal rocks which contain, besides nepheline and potash-soda feldspar, one or more alkaline mafic minerals such as biotite, alkali hornblende and alkali pyroxene.

Dept. of Geology, C. LEEANANDAM.
Osmania University, K. NARASINGA RAO.
Hyderabad-7 (A.P.), J. MALLIKHARJUNA RAO.
October 20, 1971, V. MADHAVAN.

Phomopsis eugeniae sp. nov. Causing Disease on *Eugenia jambolana* Lam.

In the course of a study of fungal diseases of various plants at Jodhpur and its surroundings, leaf spots of *Eugenia jambolana* Lam. were first observed in November, 1967, at Balsamand Gardens, Jodhpur. The lesions were irregular, apical or scattered over the lamina. At initial stage, small dot like areas surrounded by a dark brown band were produced, subsequently enlarged and changed to ashy brown. Black, fruiting pustules were present on the upper surface of the lamina. Isolation from the diseased portion was made on Asthana and Hawker's Medium A at room temperature ($25-26^{\circ}$ C). The material was sent to C.M.I. Kew, England, for identification but it could not be assigned to any of the existing species of *Phomopsis*. Due to pronounced variations in the symptomatology and morphology of the pycnidia and conidia, the isolate is being disposed of as a new species, i.e., *Phomopsis eugeniae* sp. nov.

Morphological characters.—Hyphae colourless to shining green, poorly branched, distantly septate, $2.7 \times 4.1 \mu$ wide; pycnidia globose to sub-globose, $196.4 \times 64.8 \mu$ (average 158.2μ), aggregated, slightly erumpent, light brown to dark brown, wall persistent, ostiolate; α spores hyaline, mostly ovoid to elongated, rarely slightly fusoid, $8.1-5.4 \times 2.8-2.3 \mu$ (average $6.8 \times 2.5 \mu$), single-celled, ends sub acute to obtuse, β spores hyaline single-celled, filiform, distinctly curved at one side which form a small hook $21.6-16.2 \times 1.3-0.7 \mu$ (average $18.2 \times 0.9 \mu$).

Latin diagnosis.—Hyphae in coloures vel niserter virides, pauce ramosae, ramote, septatae; $2.7-4.1 \mu$ latae; pycnidia globosa vel sub-globosa $196.4 \times 64.8 \mu$ (circa 158.2μ), aggregata, leviter erumpentia, pallide vel fusce brunnea, pariete, persistente, ostiolata; α sporulae hyalinae saepissime ovoideae vel elongatae, rare leviter fuscoideae $8.1-5.4 \times 2.8-2.3 \mu$ (circa $6.8 \times 2.5 \mu$), unicellulares, filiformes, clar curva in uno laterae in Parvo unco Producto $21.6-16.2 \times 1.3-0.7 \mu$ (circa 18.2μ). Typhus electus in foliis infectis *Eugeniae jambolana* Lam. cultura posita in C.M.I., No. 133182.

Post-graduate J. L. SHREEMALI.
Department of Botany,
Bhagalpur University,
Bhagalpur-7, September 21, 1971.