whereas the exotic types show maximum internode length from 6th to 8th internode. Nal-Tel, which is most primitive of all the exotic types, shows maximum internodal length at the 7th internode and shows shortening at the 8th. From 9th internode onwards it shows increase in length. Similar pattern for this race was found by Wellhausen *et al.*[2]. Sikkim Primitive 1 shows maximum internode length at the 9th internode and then successive decrease in length upto the 16th internode. Sikkim Primitive 2 also shows somewhat similar pattern. Nal-Tel shows only 11 internodes whereas Sikkim Primitive 1 shows 16 internodes.

In conclusion it can be said that Sikkim types show affinity between themselves but are quite distinct from the exotic primitive types. Investigations need to be done to explain the presence of these primitive types in this part of Asia.

Division of Genetics,
I.A.R.I.,
New Delhi,
May 27, 1972.

B. K. MUKHERJEE.
N. P. GUPTA.
S. B. SINGH.
N. N. SINGH.

1. Wellhausen, E. J., Alejandro, F. O. and Corzo, A. H., *NAS-NRC*, 1957, p. 511.
2. —, Roberts, L. M. and Hernandez, E. X., *Bull. The Bussey Institution of Harvard Univ.*, 1952.
3. Roberts, L. M., Grant, U. J., Ramirez, R. E., Hatheway, W. H. and Smith, D. L., *NAS-NRC*, 1957, p. 510.
4. Ramirez, R. E., Timothy, D. H., Diaz, E. B. and Grant, U. J., *Ibid.*, 1960, p. 747.
5. Hatheway, W. H., *Ibid.*, 1957, p. 453.
6. Dhawan, N. L., *Maize Genet. Coop. Newsl.*, 1964, 38, 60.
7. — and Paliwal, R. L., *Ibid.*, 1964, 38, 71.
8. Bhat, B. K. and Dhawan, N. L., *Indian J. Genet.*, 1968, 29, 321.
9. Gupta, D. and Jain, H. K., *Maize Genetics News Letter*, 1971, 45, 37.
10. Mukherjee, B. K., Gupta, N. P., Singh, S. B. and Singh, N. N., *Euphytica*, 1971, 20, 113.
11. Anderson, E., *Bull. Pioneer Hi-Bred Corn Co.*, Iowa, 1949.

SHORT SCIENTIFIC NOTES

Dipyridinium Thallium (III) Pentachloride

Compounds of thallium (III) chloride with pyridine have long been known. Meyer[1] and Renz[2] reported the preparation of $TlCl_3(C_5H_5N)_3$ by the reaction of pyridine with aqueous thallium (III) chloride. Kul'ba and coworkers[3] have claimed that the product of this reaction is in fact $TlCl_3(C_5H_5N)_2$. Cotton *et al.*[4] have also reported the compound of the formula $TlCl_3 . 2C_5H_5N$. This note deals with the preparation of a new compound of thallium (III) chloride with pyridinium chloride in aqueous medium as $(C_5H_6N)_2 TlCl_5$.

The compound is white crystalline, quite stable thermally and chemically and melts at 151° C (sharp). It is highly soluble in water, alcohol, acetone, ether, tetrahydrofuran and dimethyl formamide but insoluble in carbon tetrachloride, chloroform, dichloromethane, carbon disulphide, dioxane, cyclohexane, benzene, toluene and xylene.

12 g of thallium(III) oxide was suspended in 200 ml of distilled water and anhydrous hydrogen chloride was passed in. The solution was cooled during the absorption of hydrogen chloride (about 4 hrs required) and finally filtered. Pyridine (Analar 5 ml) was added to the filtrate and the solution was treated with more hydrogen chloride (1 hr). The solution was concentrated to 40 ml which upon cooling gave a white crystalline (needle-shaped) compound (yield 85%), its analysis corresponded to $(C_5H_6N)_2TlCl_5$ [Found : Tl, 37·5 ; Cl, 32·6 ; calcd. for $(C_5H_6N)_2TlCl_5$: Tl, 37·71 ; Cl, 32·71%]. Thallium in the compound was determined as $Tl_2O_3 . H_2O$ and chloride was estimated as silver chloride.

Department of Chemistry,
University of Delhi,
October 7, 1972.

NARENDRA KUMAR.
B. L. KALSOTRA.
R. K. MULTANI.

1. Meyer, R. J., *Z. anorg. Chem.*, 1900, 24, 321.
2. Renz, K., *Ber.*, 1902, 35, 1110.
3. Kul'ba, F. Ya, Mironov, V. E., Sazhina, V. I., and Ogibenina, T. G., *Zh. Neorgan. Khim.*, 1963, 8, 911.
4. Cotton, F. A., Johnson, B. F. G. and Wing, R. M., *Inorg. Chem.*, 1965, 4, 502.

Evidence for Pre-Hercynian Orogeny in the Chamba Region of Himachal Pradesh

The Chamba Tillite formation of Upper carboniferous is underlain by the unfossiliferous Chamba Formation (= Chail formation of Simla) which is comprised of slate, phyllite and quartzite[1-3]. The fragments of slate, phyllite and quartzite in the tillite bed show petrographical resemblance with the underlying succession of Chamba formation

and indicate that they have been derived from them as a result of erosion. The slaty cleavage, showing northwest-southeast Himalayan trend, has been developed in the matrix of tillite and the fragments have acquired a preferred orientation as a result of Himalayan, Tertiary deformation. The fragments of slate and phyllite in the tillite formation are characterised by a slaty cleavage which does not show concordance and a common origin with the cleavage, showing Himalayan trend, in the matrix of tillite. The cleavage in the fragments of slate and phyllite definitely appears to be of older generation than the cleavage (Himalayan) in the matrix of tillite. This clearly indicates that the Chamba formation, from where these fragments were derived, had already been metamorphosed and deformed (development of slaty cleavage in the fragments of slate and phyllite) prior to deposition of the Chamba Tillite formation of Upper Carboniferous, and a major stratigraphic gap exists between these two formations. The orogeny, related to this early deformation and metamorphism, is of pre-tillite or pre-Hercynian age. The presence of metamorphism and deformation of pre-Hercynian age suggests that the metamorphism in the Himalaya is not solely of Himalayan generation. Imprints of pre-Himalayan metamorphism occur, and it appears that the Himalayan metamorphism has superimposed upon the pre-Hercynian metamorphism.

Wadia Institute of Himalayan Geology. V. C. THAKUR.
Delhi University Campus, Delhi-7,
and
Centre of Advanced Study in Geology, I. C. PANDE.
Panjab University, Chandigarh-14,
September 22, 1972.

1. Fuchs, G. and Gupta, V. J., *Ver. Geol. B. A.*, 1971, **1**, 68.
2. Powell, Derek and Saxena Mahendra, *Jour. Geol. Soc.*, 1971, **127**, 595.
3. Thakur, Vikram, C. and Pande, I. C., *Bull. Ind. Geol. Assoc.*, 1972, **4**, 68.

Orbital Valence Force Field for Crystalline Borohydride and Ammonium Ions of Td Symmetry

Recently Harvey and McQuaker[1] have assigned the vibrational frequencies of borohydride ions (BH_4^-, BD_4^-) and ammonium ions (NH_4^+, ND_4^+) and evaluated the Symmetrized force constants. Present communication reports the OVFF constants of these ions. The failure of Lennard-Jones potential ($A = 6{\cdot}5$ B/R) to these ions suggests that nonbonded interaction can be explained only after considering coulomb forces in addition to the dispersion forces. The OVFF constants have been given in Table I. Although negative values of B/R have no physical significance such values have been reported by many workers[2-4]. The force constants thus calculated reproduce the observed frequencies almost exactly.

Symmetrized force constants, Table II, have been calculated using these OVFF constants. Except interaction constants F_{34}, these constants are in good agreement for borohydride ions as previously calculated by Coker and Hofer[5] and ammonium ions by Harvey and McQuaker[1].

TABLE I

OVFF constants of borohydride (BH_4^- and BD_4^-) and ammonium (NH_4^+ and ND_4^+) ions (mdyu Å)

Ion	K_1	k_α	A	B/R
BH_4^-	2·409	0·839	·037	−·102
BD_4^-	2·587	0·954	·055	−·122
NH_4^+	4·741	1·794	·097	−·274
ND_4^+	4·882	1·785	·115	−·275

TABLE II

Symmetrized force constants of borohydride and ammonium ions (mdyu Å)

Ion	F_{11}	F_{22}	F_{33}	F_{44}	F_{34}
BH_4^-	3·185 (2·99)	·310 (·316)	2·804 (2·79)	·314 (·317)	·197 (·018)
BD_4^-	3·035	·315	2·899	·312	·203
NH_4^+	5·517 5·510*	·573 ·608*	5·365 5·285*	·505 ·524*	·312 ·77*
ND_4^+	5·802	·580	5·553	·522	·336

( ) The values are taken from references 5;
* Reference 1.

The authors are grateful to Dr. N. K. Sanyal for his interest in the work.

Department of Physics, P. C. SARKAR.
St. Andrew's College, H. S. SINGH.
Gorakhpur, *September* 23, 1972.

1. Harvey, K. B. and McQuaker, N. R., *J. Chem. Phys.*, 1971, **55**, 4396.
2. Krebs, B. and Müller, A., *J. Mol. Spectry.*, 1967, **22**, 290.
3. Sanyal, N. K., Pandey, A. N. and Singh, H. S., *Ibid.*, 1969, **30**, 144.
4. Prasad, M. and Pandey, A. N., *Aust. J. Chem.*, 1970, **23**, 2011.
5. Coker, E. H. and Hofer, D. E., *J. Chem. Phys.*, 1970, **53**, 1652.

Cholesterol in the Haemolymph of *Dysdercus cingulatus* Fabr. (Hemiptera : Pyrrhocoridae)

Mammalian blood has a significant level of cholesterol and transport it to different tissues of the body. Although the cholesterol concentration of the body has been determined in many insects, the occurrence of cholesterol in insect haemolymph is known only in the larvae of honey bee[2] and *Prodenia eridania*[1] and in the pupae of *Celerio euphorbiae*[6]. The present information is on the total concentration of cholesterol in the haemolymph of fifth instar nymphs and adults of *Dysdercus cingulatus* Fabr. (Hemiptera : Pyrrhocoridae) which is a phytophagous and sap-sucking insect on cotton and other Malvaceae plants.

The technique used for the determination of total cholesterol in the haemolymph of *D. cingulatus* is more sensitive than that used by earlier workers and it is based on the colorimetric method of Zaltikia *et al.*[7]. For each determination 0·05 ml haemolymph was used from a pooled stock.

The data given in Table I show that the cholesterol level in the haemolymph of females *D. cingulatus* is higher than that of males. Further, in the 6-day old fifth instar nymphs, the cholesterol level is fairly higher than that of the males. However, these values are much higher than those of the honeybee[2], *Prodenia eridania*[1] and *Celerio euphorbiae*[6]. In higher animals including mammals the cholesterol is generally synthesized by the body in addition to that of diet. However, the phytosterols (sterols of plant origin) of the diet are not absorbed through the intestinal wall[3]. Although many insects require dietary cholesterol, they do not synthesise their own cholesterol[4,5]. However, insects can change the phytosterols of the food to cholesterol[4]. Thus the occurrence of cholesterol in the haemolymph of *D. cingulatus* is due to the conversion of phytosterols of the food into cholesterol. It is likely that such a conversion may take place either in the haemolymph or in the fat body. Thus unlike higher animals, phytosterols may be absorbed by the midgut of the insects.

TABLE I

Cholesterol concentration in the haemolymph of D. cingulatus

Stage	Age (Days)	Cholesterol (mg/100 ml) Mean values
5th instar nymphs ..	6	57
Males ..	4	50
Females ..	4	62

We express our gratitude to Prof. S. M. Alam for the facilities and encouragement.

Dept. of Zoology, Aligarh Muslim University, Aligarh, *October* 4, 1972.

MISS ZAHEER S. ZAIDI.
DR. MUMTAZ A. KHAN.

1. Baber, F. H., *J. Agr. Res. Wash.*, 1938, 57, 697.
2. Bishop, G. H., *et al.*, *J. Biol. Chem.*, 1925, 66, 77.
3. Fieser, L. F., *Scientific American*, 1955, 41, 486.
4. Gilbert, L. I., *Advances in Insect Physiology*, Ed. Beament *et al.*, Academic Press, New York and London, 1957, p. 157.
5. Gilmour, D., *Biochemistry of Insects*, Academic Press, New York and London, 1961, p. 32.
6. Heller, J., *Biochem. Z.*, 1932, 255, 205.
7. Zaltikia, A. *et al.*, *J. Lab. Clin. Med.*, 1953, 41, 486.

A New Species of *Phaeocytostroma* Petr.

Twigs of *Calamus rotang* L. bearing black, pulvinate, innate stromata were collected from Pachmarhi. The fungus was found to be a species of *Phaecytostroma*. Mathur[1] has reported an unidentified species of this genus on *Arundinella nepalensis* Trin. from India. On comparison with other existing species of this genus, it was found that apparently it resembles *P. sacchari* but the morphology and size of stroma and conidia did not agree with *P. sacchari* and *P. sacchari* var. *penniseti*. The conidia of the present fungus are smaller. The specimen which was sent to C.M.I., Kew, could not be assigned to any specific position. It is being described as *Phaeocytostroma calami* sp. nov.

Phaeocytostroma calami SP. NOV.

Pycnidia cum una stroma ; stroma innata, pulvinata, 600–900 × 270–350 μ, 5 ad 6 pycnidia in singulis stromis in unoquoque strato, aperiens per uno ostiolo ; ostiolum 60–70 μ in diameter ; paries stromatalis niger, tri-cellularis, 15–19 μ crassus ; conidiophora hyalina, 6–8 × 2–2·5 μ ; conidia super conidiophorum ramosorum apicibus porata, unicellularis, crasso pariete, fulva, 8–11 × 3-4·5 μ :

Ad ramnuculos *Calamus rotang* L., Pachmarhi, October, 1971, Specimen depositum apud C.M.I., Kew, Herb. IMI 162201 Coll. J.U.M.I. 98.

Pycnidia with a stroma ; stroma innate, pulvinate, 600–900 × 270–350 μ, 5 to 6 pycnidia in each stroma in single layer, opening by an ostiole ; ostiole 60–70 μ in diameter ; stromatal wall black,

3-celled. 15–19 μ thick; conidiophores hyaline. 6–8 × 2–2·5 μ; conidia borne on tips of branched conidiophores, light-brown, 1-celled, thick walled, fusoid, 8–11 × 3–4·5 μ.

On the twigs of *Calamus rotang* L., Pachmarhi, October, 1971:

Specimen deposited with C.M.I., Kew, Herb. IMI 162201 Coll. J.U.M.L. 98.

The authors are grateful to Drs. A Johnston and Sutton, C.M.I., Kew, for the help in the identification of the fungus. Thanks are also due to the Rev. Father William Barracos for the Latin diagnosis.

Mycology and Plant Pathology Laboratory,
Department of Botany,
University of Jodhpur,
Jodhpur. *September* 12, 1972.

K. S. PANWAR.
A. BOHRA.

1. Mathur, R. S., *Ind. Phytopath.*, 1971, 24 (3), 596.
2. Sutton, B. C. and Waterston, J. M., *C.M.I., Description of Pathogenic Fungi and Bacteria*, C.M.I., Kew, 1966, 9, 81.

Chemical Analysis *Actiniopteris radiata* (Sw.) Link.

Actiniopteris radiata (Sw.) Link. is a xerophytic species of the fern family Actiniopteridaceae. It is of limited distribution and in areas where it occurs, is restricted to depleted walls and rocky crevices of steep slopes of exposed hilly areas. The species has been worked out during the last decade, regarding various botanical aspects[1-3,6,8]. Ferns are known to resist infection by pathogens and insects[4,5,9] and many of them possess medicinal value[7]. Keeping these points in view, a preliminary study of the chemical constitution of the plant *A. radiata*, has been made.

The mature sporophytes were collected from Khetri (Rajasthan), dried under shade and powdered coarsely. The powder was extracted successively with petroleum ether and then with ethanol in a soxhlet extractor. After evaporation, the extract was concentrated and stored in a refrigerator separately.

The ethanol extract showed accumulation of a crystalline compound at the bottom of the container. This extract was further diluted in absolute ethyl alcohol and employed for further investigation.

The extract gave a positive test for the presence of 3-hydroxyflavones. Investigations using paper chromatographic techniques, with different solvent systems, indicated the presence of only one flavone. This was identified as Quercetin-3-rutinoside (or Rutin).

The occurrence of large percentage of phenolic compounds in ferns does not allow fungi or other microorganism to attack them[4,5,9]. *Actiniopteris* has been reported to possess anthelmintic and styptic properties[7]. The ingredient responsible for this property is Quercetin-3-rutinoside. This compound also occurs in ferns like *Pteridium aquilinum* and *Dryopteris oligophlebis* and has been used to decrease the fragility of blood capillaries, as a herbal remedy, as an antioxidant towards adrenalin and ascorbic acid and is also said to relax smooth muscles. It is also added in multivitamin preparations and possesses antibiotic properties as it inhibits germination of uredospores of *Puccinia* graminis f. *tritici*.

The authors are grateful to Prof. V. Puri (Meerut University, Meerut) and Prof. L. N. Rao (Mysore University, Bangalore) for going through the manuscript.

Birla Institute of Technology,
Pilani, Rajasthan,
May, 30, 1972.

S. BHAMBIE.
H. P. TIWARI.
C. X. GEORGE.

1. Bhambie, S. and George, C. X., *Curr. Sci.*, 1972, 41, 258.
2. Gopal, B. and Bhambie, S., *J. Sci. Res. Banaras Hindu Univ.*, 1965–66, 16 A, 161.
3. — and —, *J. Indian bot. Soc.*, 1966, 45, 54.
4. Harbone, J. B., *Comparative Biochemistry of Flavanoids*, Academic Press, N.Y., London, 1967.
5. Hutto, T. A., *Amer. Fern, J.*, 1961, 51, 139.
6. Mehra, P. N. and Verma, S. C., *Caryologia*, 1960, 13, 619.
7. Nayar, B. K., *Bull. Nat. Bot. Gard.*, 1959, 29, 1.
8. Pichi-Sermolli, R. E. G., *Webbia*, 1962, 17, 1.
9. Soottoo, C. F., *Amer. Fern J.*, 1961, 51, 139.