by one of the authors in 1928, and it was pointed out that *Barbus beavani* Gunther had to be relegated to the synonymy of *B. chagunio*. Messrs. G. E. Shaw and E. O. Shebbeare's collection from the rivers of Northern Bengal has shown that *B. spilopholus* McClelland, a species characterised by the prolongation of the posterior rays of the anal fin and by the well-marked tubercular pads on the head, represents the males of *Barbus chagunio*. It is now clear that both *B. beavani* and *B. spilopholus* are synonyms of *B. chagunio*. A few remarks were made on the Sex Ratio in this species.

3. B. SAHNI AND A. R. RAO.—*On Some Jurassic Plants from the Rajmahal Hills.*

The paper dealt with collections made by parties from the Lucknow University during the years 1927, 1931 and 1932. The fossils described come from eight different localities, all in northern part of the Rajmahal Hills.

Several of the fossils belong to new species, but as some of them are only small fragments, names have been assigned only to three. The known species are only described or figured in so far as our specimens extend our previous knowledge.

A description of the localities with table showing distribution of species, Equisetales, Filicales, Cycadophyata, Coniferales, Incertæ, was given.

4. V. NARAYANASWAMI.—*Additional information concerning the Provenance of the Plants constituting the Malayan Collections of Sir George King, Hermann Kunstler, Father Benedetto Scortechini and Leonard Wray, being a Supplement to Sir George King's 'Materials for a Flora of the Malayan Peninsula' and Mr. H. N. Ridley's 'Flora of the Malayan Peninsula'.*

If Mr. Ridley's 'Flora of the Malayan Peninsula', published in five volumes between 1922 and 1925, be examined, it will be seen that a great many of the species described from materials laying in the Calcutta Herbarium are imperfectly localised. Nor were the exact localities given of the plants described by Sir George King and his helpers in the 'Materials for a Flora of the Malayan Peninsula'. Yet in regard to rare plants, exact localities are necessary and, to meet the need, the author has drawn up this compilation at the suggestion of Mr. I. H. Burkill, at one time of the Asiatic Society of Bengal, and afterwards Director of the Botanical Garden at Singapore.

After the papers were read DR. JOHAN VAN MANEN made a communication on *A new translation of the Gita Govinda*. Dr. B. Faddegon, Professor of Sanskrit in the University of Amsterdam, well known on account of his elaborate monograph on the Vaicesika-system, has published a translation of the *Gita Govinda* in Dutch. The translation is of considerable scholarly as well as poetical interest. A thoughtful introduction suggests some valuable explanations with the help of the psycho-analytic method.

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We acknowledge with thanks the receipt of the following:—

"Nature," Vol. 130, Nos. 3285–3288.

"Chemical Age," Vol. 27, Nos. 694–697.

Report of the Zoological Survey of India for 1929-32.

"The Indian Forester," Vol. 58, No. 11, Nov. 1932.

"The Journal of the Indian Mathematical Society." Vol. 19, No. 10.

"Journal of the Bombay Natural History Society." Vol. 36, No. 1, November 1932.

"Scientific Notes of the Indian Meteorological Department."

Reviews.

GEOFYSISKE PUBLIKASJONER, Vol. IX, No. 9. *Exploration de quelques perturbations atmospheriques a l'aide de sondages rapproches dans le temps.* By J. Bjerknes (Oslo: Det Norske Videnkaps-Akademi, 1932.)

Dr. J. Bjerknes' recent memoir on the investigation of some European atmospheric disturbances with the aid of successive soundings of the atmosphere carried out from Uccle in Belgium will doubtless rank as a classic of meteorological literature. The study is based on two sets of registering balloon ascents, the first set comprising 25 soundings in the period 26, 27 and 28th December 1928, and the second 7 soundings on 29–30th March of the same year. The soundings were made under the direction of Mons. Jaumotte, Director of the Royal Meteorological Institute of Belgium with instruments devised by him, and many of the balloons penetrated well up into the stratosphere.

The idea that "weather" is caused by perturbations of the atmosphere involving large-scale movements of air masses with a meridional component of motion and the consequent coming together of "air-masses" with differing temperatures and moisture-contents is no doubt old, but at the present day it has acquired a new definiteness and precision, thanks largely to the work of the Norwegian school of meteorologists. The feature of distinction of the present study from previous studies on the same subject lies in the greater fullness with which the properties of "air-masses" and of the associated "fronts" are followed out not only at the surface, but also in the free atmosphere up to the tropopause. Many points of detail about temperature and humidity distribution in height, which were hitherto either matters of theory or only supported by scattered observations, are now brought out lucidly and in a connected manner

with a definite individual series of disturbances.

The first of the series of ascents treated in this memoir reveals the story of a primary cyclone which moved in an approximately west-to-east direction across Scandinavia on the 26th December and of a secondary cyclone which followed it across Belgium on the 28th. Dr. Bjerknes shows that the whole sequence of phenomena was due to the eastward movement of a tongue of "cold" or "polar" air-mass whose maximum thickness over Uccle reached 5 km. and whose horizontal west-to-east extension was about 2000 km. The vertical section of the advancing and receding sides of the cold air-mass have shapes suggestive of the head and tail of the longitudinal section of an ærofoil. An interesting explanation is given of the continuous precipitation which occurred at Uccle before the arrival of the advancing or "aggressive cold wedge" as being due to the generation of a vortex of warm air in front of the advancing cold air, thus forming an obstacle for the rest of the inflowing warm moist air. This explanation is supported by the lines of flow of air which he has drawn identifying them with lines of equal entropy. As far as the writer is aware, this is the first occasion when isentropics, based on observation, have been presented in connection with a definite atmospheric disturbance.

Dr. Bjerknes has also shown that although the maximum thickness of cold air was only 5 km. over Uccle, further north-east, it extended right up to the tropopause.

It is well known that the height and temperature of the tropopause vary normally from about 17 km. and —80°C over the equator to 8 km. and —50°C over a latitude of 75°. These values are only average, and there are considerable day-to-day variations which are much more marked in temperate than in tropical latitudes. As a result of statistical studies, notably by Schedler in Germany, it had been established that a rise of the tropopause in temperate latitudes corresponded to conditions more tropical than those normal to the latitudes while a fall of the tropopause represented more polar conditions. Dr. Bjerknes has now shown that this result is true not only as an average but is also true of changes connected with individual cyclones. Similarly, the high positive correlation between the height of the tropopause and the pressure at 9 km. which had been established statistically by Dines is shown to be true of individual disturbances. Dr. Bjerknes has also pointed out the close physical connection between the perturbations of the tropopause and those that occur in the lower layers of the atmosphere.

It is not possible, in a short review, to summarise the many new points of view, or the old points of view presented in a more illuminating manner contained in this memoir. The thanks of all students of the Physics of the Atmosphere are due to Dr. Bjerknes for this classical piece of work and to Mons. Jaumotte for the series of soundings which made it possible.

K. R. RAMANATHAN.

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A Naturalist in the Guiana Forest. By Major R. W. G. Hingston. 16 plates and 150 illustrations. 18*s*. net. (Edward Arnold & Co., London, 1932.)

Here is a fascinating story of a teeming and fantastic insect world in which camouflage and mimicry, as protective devices, are practised with an artistry seemingly beyond even the most adroit efforts of man. Major Hingston opens up a world stranger than any yet revealed in fiction, the marvels of which are told with the skill of a Fabre. Here you may read of the association of spiders into a community and of their association with ants: the spiders constructing communal hammocks—one come upon was as tall as a man and able to hold a child —in which ants build their nests, with eggs, larvæ and pupæ complete. These ants, in return for the hammock-accommodation, protect the spiders by taking a vigorous offensive when the hammock is disturbed and the spiders escape to safety.

You may also read of butterflies with false heads; of caterpillars which mimic snakes and are provided with poison spines; of a certain species of *Laternaria* whose heads are prolonged into a thick shovel-shaped beak on which are modelled the features of an alligator; and of Cicadas which squirt with force a fluid at their enemies. Again, you may read of ants which make bridges by linking themselves to each other; of termites on foraging expeditions; and of a battle royal between ants and termites.

This book is a narrative of the experiences and observation of the expedition, of which Major Hingston (whose biological work in India is so well known) was the leader, organized and despatched to British Guiana by the Oxford University Exploration Club

three years ago. Its purpose was to study the fauna and flora of the equatorial rain-forest, but its main objective was to learn something of the teeming life in the forest roof, a dense green canopy through which sun and rain can hardly penetrate.

The book is in two parts. Part I describes in detail the life and doings of the expedition, and contains information concerning a number of practical matters which may be of use to any future party following the trail blazed by Major Hingston and the members of the expedition. Part II is devoted to records of detailed observations made in a forest described as "remarkably luxuriant, fully equal to that of the Amazon, and exceeding in splendour the Asiatic forests, where the great trees are taller, the tangle of bush-ropes more profuse and spectacular, and the crowding of epiphytes on the stems and branches more riotous in their diversity and confusion." *A Naturalist in British Guiana* certainly takes its place with the other classics of biological exploration and observation, and will be eagerly read by those whose interests in biology extend beyond the limits of laboratory study.

H.E.R.

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Tables of Cubic Crystal Structures of Elements and Compounds. By I. E. Knaggs, Ph.D. & B. Karlik, Ph.D. (Adam Hilger, Ltd., London.)

It is now almost axiomatic that X-rays serve as a powerful weapon in the study of Crystal Structure. In addition to the pioneer work of the Braggs, so much literature has accumulated on the subject of X-ray crystallography within the last twenty years that "the average researcher," says Sir William Bragg in his foreword, "will no doubt feel some satisfaction in realizing that long searches by many workers have been rolled into one, and that they (the authors) have earned the gratitude of those whose labour they have saved."

In addition to the principal data for a large number of crystals, a very extensive list of references—complete up to August 1931—is added. The usefulness of this work in this field can hardly be overestimated. "Crystal Structures in order of spacing" is the heading of another list which the authors claim to be immensely useful with the "Hilger Crystallograph" and interpretative chart.

Dr. C. F. Elam, the metallurgical specialist, has further enhanced the value of this book by contributing a corresponding set of tables dealing with alloys.

P.S.

Coming Events.

Indian Science Congress.

20TH SESSION.

Patna, 2nd—7th January, 1933.

Society of Biological Chemists (India).

2ND ANNUAL BUSINESS MEETING.

Government Medical College, Patna, 3rd January, 1933 (2-30 P.M.).

University of Madras.

EXTENSION LECTURES.

5th January 1933.
"Ancient South Indian Policy and its bearing on our Present Problems", by Dr. S. Krishnaswami Iyengar, M.A., Ph.D.

12th January 1933.
"Trade Union Movement in India", by Mr. P. S. Loganathan.

19th January 1933.
"Agricultural Improvement in Madras", by Mr. S. V. Ramamurti, I.C.S.

26th January 1933.
"Co-operative Movement in the Madras Presidency—Its Achievements and Failures", by Mr. D. N. Strathie, I.C.S.

30th January 1933.
"Poor Relief in Other Lands", by Miss T. Joseph.

6th February 1933.
"The Problem of the Indian States", by Mr. M. Ramachandra Rao.

10th February 1933.
"Federal Finance, the Main Problem", by Dr. P. J. Thomas, M.A., Ph.D.

13th February 1933.
"The Emergence of the State", by Mr. M. Rathnaswami, C.I.E.

17th February 1933.
"Disarmament", by Mr. J. Franco.

20th February 1933.
"Political Economy was the States' Master in the Nineteenth Century, while in the Twentieth it became its Slave", by Fr. Bassenach.