The Arc Spectrum of Tellurium.

THE arc spectrum of Tellurium has been investigated from the visible down to λ 1600 using an ordinary arc between Acheson Graphite poles containing pure Tellurium as source in the visible and quartz regions. Between λ 2000 and λ 1600 an arc in Nitrogen in the manner used by K. R. Rao,[1] has been photographed by a Vacuum Grating Spectrograph. The data obtained have led to the confirmation of the level scheme of TeI proposed by McLennan[2] and others and also to the identification of the combinations involving the 5d and presumably the sp^5 levels of the spectrum. The important intervals 5d $^3D_1$ -- 5d $^3D_2$ and 5d $^3D_2$ — 5d $^3D_3$ are 196 and 789 cms^{-1} respectively. Adopting the value 72667[3] for the deepest term 5p $^3P_2$ of the spectrum a number of new low-lying energy levels 22624, 20800, 16997, 13923, etc., have been discovered. The detailed scheme will be published elsewhere.

S. GOPALAKRISHNA MURTY.
Science College,
Andhra University,
Waltair,
November 20, 1933.

On the Feeding Habits of *Belostoma indica*.

THE mode of feeding of this giant water-bug was observed in the Laboratory to elucidate certain points regarding its feeding habits. The bug measured three inches in length and one inch across the thorax. As is well known it floats on the surface of water and if submerged produces the anal tube for respiration.

Tadpoles of various sizes were supplied. Small tadpoles could not be held between the grooved fore femur and tibia partly owing to the small size of the animals and partly that any slight touch would dart them away. Frogs about one inch long and half inch wide were easily caught and held fast between the forelegs and the bug pierced its stylets up to the base at any soft place usually between the arm and belly and sucked out the fluid till the animal was flabby.

Efforts to get away on the part of small frogs were of no avail as the grip was very tight even so much that it was difficult to take the animal away with the forceps.

Larger specimens of frogs were later on supplied and in no case was the bug found feeding as has been described by Herbert Manners [1] or as is shown in the drawing by R. C. Wood. On the other hand such large specimens of frogs moved away or jumped, much frightened, on the approach of the bug.

Artificial attempt to feed on larger frogs revealed further that the skin in these was tough and slippery for the stylets to pierce and the bug left such specimens for want of successful feeding. Pieces of dissected tissue of frog were also caught by the fore legs and feeding was resumed.

Attempts to feed this bug on other aquatic Hemiptera (*Nepidæ*) and water-beetles (*Dytiscidæ*) were unsuccessful probably due to their hard exoskeletons.

U. S. SHARGA.
Entomology Department,
Agricultural College,
Cawnpore,
November 24, 1933.

A Cranial Abnormality in the Indian Mackerel—*Rastrelliger kanagurata*.

IN the normal cranium of this interesting fish, it will be noticed that there is an epiotic on either side of the supraoccipital and above the exoccipital. The epiotic has three outer surfaces—dorsal, lateral and posterior and is pointed postero-laterally. The dorsal surface of the bone sends antero-inwards a thick ridge which is continuous with a similar one from the supraoccipital and forms the upper edge of the posterior surface of the cranium. The lateral surface forms the inner wall of the temporal groove and the posterior surface contributes to the posterior wall of the cranium. The inner or the cranial surface of the bone has a small and a large recess. The two recesses are partly separated by a thin ridge, and are in continuation with each other at the base. The posterior semi-circular canal enters the wide recess and comes out of the bone through the smaller one.

In the specimen under consideration the left epiotic is absent and in consequence of

---

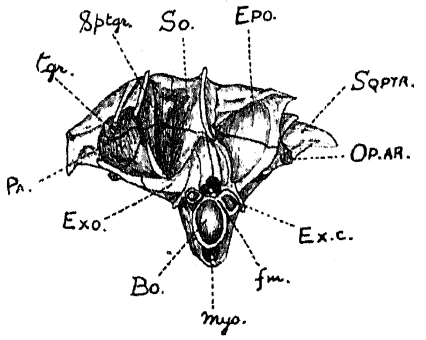
[1] *Proc. Roy. Soc.*, **A. 124,** 465, 1929.

[2] *Phil. Mag.*, **4,** 486, 1927; also *Nature*, **124,** 874, 1929.

[3] Ruedy: *Phy. Rev.*, **41,** 588, 1932.

[1] Maxwell-Lefroy, H., *Indian Insect Life*, pp. 714-764.

this, considerable changes have taken place in the posterior region of the cranium. The supraoccipital bends considerably postero-laterally on the left side and articulates directly with the squamosopterotic and the exoccipital. The supratemporal groove on the left side has become very deep and extends even over the exoccipital. The exoccipital has developed a thin vertical ridge which is continuous with the ridge of the parietal forming the outer and inner



The Posterior View of the Abnormal Cranium of *Rastrelliger kanagurata*. (×2)

Bo.=Basioccipital. Epo.=Epiotic. Ex.c.=Exoccipital condyle. Exo.=Exoccipital. fm.=foramen magnum. myo.=posterior opening of the myodome. Op.ar.=Opisthotic articular facet. Pa.=Parietal. So.=Supraoccipital. sptgr.=supra-temporal groove. Sqptr. = Squamosopterotic. tgr.=temporal groove.

walls of the supratemporal and temporal grooves respectively. The exoccipitals, with the foramen magnum, have slightly shifted to the right side. The articular condyle of the right exoccipital and also the articular facet of the right opisthotic (for the lower limb of the post-temporal) are more prominently developed than in normal crania. And the same structures on the other side of the cranium are ill developed. The cranium is being worked out in detail in this laboratory and a complete account is proposed to be published soon elsewhere.

M. JAYARAM NAIDU.
B. S. BHIMACHAR.
Zoological Laboratory,
University of Mysore,
Bangalore,
November 1933.

Hydro-Electric Schemes in India.

WITH reference to the letter of Dr. H. E. Watson on page 54 of the August issue of your *Journal*, the following information may be useful:—

I. It is true that other Power systems in India have adopted 50 cycles as the frequency; but Mysore has not been cut off from all co-operation with her neighbours on that account. On the other hand, Mysore has taken the lead and set an example in such co-operation. In the year 1928, the Government of Madras were considering various plants to put up a temporary Diesel Engine Power Station of about 4,000 E.H.P. to supply electricity to drive various machinery connected with the construction of the gigantic dam across the Cauvery River at Metur. The Government of Mysore considered this a suitable opportunity to help Madras and offered Cauvery Power from Sivasamudram at such a reasonable rate that the Madras Government abandoned their Diesel Engine Scheme and entered into negotiations with Mysore with the stipulation that electric power to be delivered to them must be of 50 cycles, 3-phase and 3,300 volts to suit their Transformers and Motors. A double circuit 63 mile High-tension Transmission line (35,000 volts) was built, and step-down plant was installed at Metur, which included suitable Frequency Changers to convert power from 2,200 volts, 25 cycles to 3,300 volts, 50 cycles. The system has been working satisfactorily for the last five years and has saved the Madras Government a few lakhs of rupees and incidentally benefited Mysore.

II. In the event of general Railway Electrification Mysore will have no special difficulties. The standard system for traction adopted by the G. I. P. and South Indian Railways is 1,500 volts D. C. and any power scheme with A. C. power of 50 cycles or 25 cycles has to install Rotary Converters or mercury arc rectifiers to convert A. C. power to D. C. just as the above Railways have done.

III. So far as Electric Power Machinery are concerned it is just as easy to obtain 25 cycle equipment as 50 cycle. The bigger machines are so special that they are built to order and it is only a matter of design to construct them for 25 cycles. Small size Motors and Transformers of 25 cycles have been standardised by the bigger Electrical Manufacturers of the world and they are easily available.

IV. People at Sivasamudram and Kolar Gold Fields have been using 25 cycle power for lights for the last 31 years, and their eye-sight is as good as ever. In these days