

that the observations of Kamerer of Nürnberg (Camerarius) anticipated by two years the publication of Ray's "Historia Plantarum," I must refer him and any of your readers who are interested in the subject to Sachs's "Geschichte der Botanik."

Linnaeus ("Amoenitates," vol. i. pp. 329, 330) thus sums up the relative merits of Millington, Grew, Ray, and Camerarius: "Thomas Millington, eques Anglus, Professor Savilianus, primus videtur, qui insigni cura in hanc veritatem eruendam incubuit, viamque aperuit experientissimo Grewio. Nehemias Grew, in anatome Plantarum, sexus diversitatem et fecundationem plantarum per farinam masculae scrutari conatus est; cujus *hypothesis*, album addidit calculum temporis sui botanicus eximus Rajus. Rudolphus Jacobus Camerarius primus perspicue demonstravit sexum et generationem, quamvis non dubii fuit ipse expertus de hac veritate, quod si moverant experimenta quae fecerat in Cannabe."

Now as to Theophrastus. Your correspondent makes much of the "prolific virtue" ascribed to the pollen-grains by Grew. No one, however, can have read the writings of the early Greek and Roman naturalists without having learned, that not only did they distinguish male and female flowers, but also ascribed a "prolific virtue" to the pollen. Without troubling your readers with a Greek quotation, let us hear what a commentator on Theophrastus says:—"Theophrastus ait, fructum in palma feminae perdurare nunquam posse nisi florem maris cum pulvere super eam concusserint;" and again: "In palma maris et feminae coitus sit;" or again, Pliny: "Adeoque est veneris intellectus, ut coitus etiam excogitatus sit ab homine ex maribus, flore, et lanugine, interim vero tantum pulvere inspersione feminis."

I hardly think your readers generally will agree with "A. B. C." in his opinion that "time, paper, and ink are wasted" in a discussion of a historical point of some interest.

Dec. 24 ALFRED W. BENNETT

Saw-fish Inhabiting Fresh Water

IN NATURE, vol. xiii. p. 107, Mr. Wood, of Manila, writes on "Saw-fish inhabiting fresh water," in the Laguna de Baij, Luzon, as on something curious and new. But this fact was known long ago; not only do sharks live in fresh water there, but also elsewhere on the globe. As one who mentions the saw-fish in the Laguna de Baij, I only name the famous de la Girondièrè ("Aventures d'un Gentilhomme Breton," 1857). He says, p. 102: "Deux poissons de mer se sont acclimatés dans les eaux douces du lac: le *reguin* et la *scie*. Le premier est heureusement assez rare, mais le second est très abondant."

The species of saw-fish mentioned is *Pristis perrotelli*, a species of very wide distribution; it has been collected in the Atlantic (West Indies), in the Indian Ocean (Zambesi), in the China Sea (Borneo), &c.

When on Luzon in the year 1872, I succeeded in procuring a series of specimens on the spot, which I brought home; they are from two to three feet long, but I saw, myself, at the fish-market of St. Cruz a specimen of about twenty feet in length. Quantities are to be seen on every market day in St. Cruz, the flesh being very cheap on account of its bad and dry quality, and only the poor mountaineers like it as food.

I took some trouble to get those smaller specimens home, because I fancied that they might possibly differ from the marine specimens (Bay of Manila). But an accurate comparison showed no difference at all, and therefore the changed conditions seem to have had no influence on the external features of the species.

The saw-fishes are said to fight violently with the crocodiles, which occur in large quantities in the Laguna, and I do not doubt the fact.

A. B. MEYER

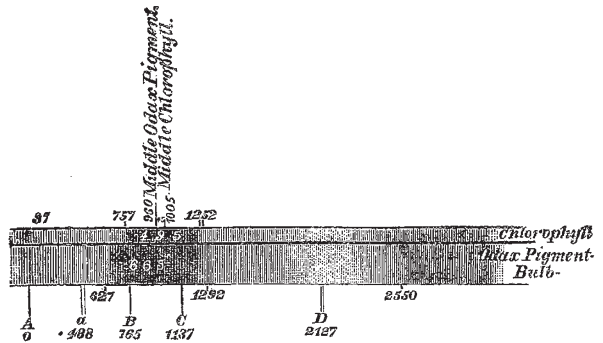
Dresden, Dec. 23

Spectrum of Fish-pigment

I HAVE lately observed the spectrum of a pigment-colour found under the scales in fins and tail, mouth and eyes, of a small smelt-like fish found in St. Vincent's Gulf, S.A. They are commonly known as the Weed fish, but Mr. Waterhouse, our Curator, informs me they are the *Odax radiatus*, *O. frenatus*, *O. Richardsonii*. These fish are perfect little gems for colour, being of a bright blue green (nearly blue) in *O. Richardsonii*, and about the eye most splendid; black centre, brilliant orange ring, outside of which is a most brilliant turquoise blue ring set in deep brown.

Finding this colouring matter stained paper, I examined the scales and fins by spectroscope, and noticed a deep band that appeared to correspond with the deep band of chlorophyll. I send a sketch of the respective spectra and a bulb and tube of the pigment in solution, which, with the pieces of tail and fins, I trust you will receive in good condition. I do not place much faith in it remaining clear and brilliant; the heat of the ship may possibly destroy or alter it. You will notice the solution is rather bluer than chlorophyll. This pigment is nitrogenous, is destroyed by heat, chlorine, acetic acid, alkalis, ammonia, and alcohol. It is soluble in water and sea-water. Sulphuric acid precipitates it with albumen of fish, but does not destroy colour. Light bleaches it. Its chemical properties are therefore distinct from those of chlorophyll.

I consider some interest attaches to this from the fact of the Parrot-fish (*Labrichtus Richardsonii*) being marked with blue stripes containing the same colouring matter; also the scales and parts in *Odax* coloured orange give a green tint almost identical in shade to chlorophyll. This yellow or orange does not give



Spectra with kerosine flame on edge of *Odax* pigment and comparison with chlorophyll.

Dividing the Solar spectrum into 10,000 parts from A. bright kerosine flame on edge gives as above. The chlorophyll band is rather lighter in the centre; when solution is dilute it divides into two fine lines. Width of strong band, 495.

The *Odax* Pigment does not resolve into two lines. The centres of these two great bands *Odax* Chlorophyll are only forty-five apart. Width of band, 665; rather nebulous, especially at end of greatest refraction. Some very faint bands occur each side of D, and continue to end of nebulousity to 2,550. The bulb gives the above figure. The tube a much narrower band, but centre coincides with bulb.

any band or interfere with the spectrum of the pigment, except so far as its mere colour and general absorption at blue end arising from such colour.

Now as chlorophyll has been said to be found in some infusoriae, which I doubt, it is just possible that this or similar colouring matter is taken for it. I have been rather curious in examining animal greens in shells, and a native green silk we have here, also in the Emu egg-shell, but cannot find the slightest trace of chlorophyll band, and until I met with this I concluded no animal green yielded any band that could be mistaken for chlorophyll, and that therefore the spectroscope was an unerring test for distinguishing between vegetable and animal organisms. This spectrum of *Odax* pigment, which possibly I may find in other species of fish, Actiniadae or Medusae, many of which are beautifully coloured, is therefore so far of interest. I trust these remarks may be interesting and lead to some inquiry in this direction.

The dry pieces of fins and tail, also a piece of stained paper, will show well if mounted in balsam. If the colour is not deep enough, cross the layers one over the other until sufficient depth of shade is obtained. I use half-inch object glass in microscope except for scales and spots, when I use quarter, and shut out all other light; single scales then show the bands well.

GEORGE FRANCIS

Laboratory Institute, Adelaide, Oct. 9

Function of the Ocelli of Hymenopterous Insects'

MY brother, Fritz Müller (Itajahy, Prov. St. Catharine, South Brazil), in his letters to me, has repeatedly started the question whether the size of the ocelli of hymenopterous insects is not dependent on their nocturnal habits. He supports this opinion by the following observations:—