

Amongst the indispensable tables should be included Zech's addition and subtraction log table, which is easy to use and accurate. For eight-figure work the best, if not the only, tables are Bauschinger's and Peters's.

R. T. A. I.

Johannesburg, April 4.

### The Colour of Primrose Flowers.

NATURE of April 1, 1920, p. 139, published an interesting article on the colouring matters of plants. From this article it would appear that the normal pale yellow colour of the primrose is due to a yellow sap pigment, a derivative of flavone. Primroses, however, are found with a range in colour from deep red to almost white. Can any of your readers say to what this variation from the normal is due, and whether the colours are anthocyanins?

Much attention has recently been directed in the local Press to this variation in colour, and many attempts made to account for it. It is common in parts of Pembrokeshire, but is usually confined to a particular bank or field in the district.

It is said to occur only in the Coal Measures, and is probably due to the presence of iron in the soil or to insect action causing a cross with polyanthus. It is even stated that to plant a normal primrose upside down causes a red coloration.

A possible theory may be the cross from polyanthus, but it is generally agreed that but one insect affects primroses, called sometimes a "primrose sprite," resembling a bumble-bee, but with a long, characteristic proboscis. The late Lord Avebury in "British Flowering Plants" suggests a moth.

These variations are, however, found remote from cultivation, and I have not been able to ascertain a single instance of a red primrose in a cultivated garden unless planted there from a hedge-bank, when it attains an even deeper red, and often develops the umbel of the polyanthus.

R. O. LATHAM.

Pembrokeshire, April 12.

IN reply to Major Latham's inquiry, I may say that in the red primroses which I have examined the colour is undoubtedly due to an anthocyan pigment. Pale yellow or white primroses contain no anthocyan. Flavonols rarely give rise to much colour, and do so only when present as salts (phenolates) of metals. Even in primroses there is often a very small amount of a yellow plastid pigment present which produces proportionately far greater colour effect than the flavonol derivatives that exist in the sap. The conversion of the yellow sap pigments (flavonols) to anthocyanins is a process of reduction. Exactly what causes such a change to take place in plant-life is not yet fully determined, but the work of Prof. Keeble and of Miss Wheldale has done much towards elucidating this matter. When, as I boy, I tried the method of planting primroses upside down to get red or variegated varieties (the country folk in the district believed that this method was effective), it was never a success. In general, it would appear that new colour varieties in flowers are most frequently produced as a result of crossing. Seeds of red or white varieties of primrose are offered by some seedsmen.

THE WRITER OF THE ARTICLE.

### The Resonance Theory of Hearing.

IN the absence of a reply to Dr. Hartridge (NATURE, April 14, p. 204) from a more authoritative quarter, I venture to suggest that his expression "a continuous musical note" is not appropriate to the phenomenon discussed. By changing the time-interval between successive siren-puffs from  $\tau$  to  $\frac{3}{2}\tau$ , the experimenter interrupts the periodicity of the vibrations producing the fundamental tone of his note, and the consequent discontinuity in the note is perceived by his ear as something indistinguishable from a beat (which, physically, it is not). According to the "dead beat" view, this effect in the sensorium is due to the last vibration of the interrupted series, because there is no resonator in the cochlea which by continuing to vibrate would make the temporary interruption imperceptible. If the interruption-effect were lacking when the resumed vibrations are not of precisely opposite phase, there would be something in Dr. Hartridge's argument.

Though at present reluctant to contribute further to what Prof. McKendrick has called an interminable discussion, I hope that the *horetgraphe* which Mr. Daniel Jones is shortly to install in the phonetics laboratory in this college will bring a termination within view.

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London, W.C.1, April 28.

### Biological Terminology.

I DO not wish to be drawn into the whirlwind of controversy raised by Sir Archdall Reid; only from a respectful distance would I protest against his *obiter dictum* that "systematic zoology and botany are purely descriptive" as opposed to "interpretative science." Every specific name is of itself an interpretation; "*Equus asinus*" is a statement that the creature is closely akin to "*Equus caballus*." The classification of any group, and still more the classification of a whole kingdom, contains a long chain of interpretations. Modern systematic work—with which Sir Archdall Reid must surely be ill acquainted—deals at every step with "problems of heredity, evolution, development, and the like." There may still be a few people who confine their energies to pure description of the objects in front of them; but why call them systematic zoologists or botanists?

F. A. BATHER.

### Experimental Geometry.

DR. JEFFREYS (NATURE, April 28, p. 267) claims that "experimental geometry" is a contradiction in terms. I protest vehemently. "Geometry" means the measurement of the earth. How can you measure the earth without experiment? It is "logical geometry" that is the contradiction in terms; it is that expression, which has introduced all this confusion between logic and experiment; and it is the mathematicians, not the experimenters, who have stolen the word and perverted it from its proper meaning.

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### Italian Meteorites.

AS reference was made in NATURE of March 31 (p. 149) to records of Italian aerolites, it may be noted that there were fourteen falls of stones or earth in central Italy recorded in forty years from 208–168 B.C. It appears that the earth was then passing through a region of aerolites. The references in Livy are under the years A.U.C. 545, 548, 550, 558, 559, 561, 564, 567, 575, 579, 580, 583, 584, and 585.

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