

and history, for French and German, and for a careful study of English literature and language, we assert that by improved methods, by dexterous tiring, and by greatly increased personal labour, we teach these new subjects thoroughly, and by no means neglect the old ones."

*Engineering* records the death, on the 16th inst., at New York, of Mr. Thomas Ewbank, the well-known writer on hydraulics. He was born at Barnard Castle, England, in 1792, and, after being apprenticed to a tin and coppersmith, came to London, where he spent all his spare time in scientific study. In 1819, being then a member of several learned societies, he emigrated to New York, where he was engaged for seventeen years in business as a manufacturer of lead, tin, and copper tubing, which occupation he relinquished in 1836 for purely scientific work. Besides contributions to scientific journals, and labours on various Government scientific committees, Mr. Ewbank was the author of "A Descriptive and Historical Account of Hydraulic and other Machines for Raising Water, both Ancient and Modern;" "The World a Workshop, or the Physical Relation of Man to the Earth;" "Life in Brazil, or the Land of the Cocoa and the Palm;" and numerous smaller publications.

THE United States steamer *Kansas*, now fitting out at the Washington Navy Yard for duty on the Tehuantepec and Nicaragua Expedition, was, according to *Engineering*, put in commission about a fortnight ago. The *Kansas* will be the principal vessel of the expedition. The survey in Nicaragua will embrace the route for a canal advocated thirty years ago by the Emperor Napoleon. That in Mexico by the Tehuantepec river possesses less interest, owing to the length and difficulties of the route.

THE first quarterly number of the *Journal of the Iron and Steel Institute* is announced to appear with the new year.

MR. ADOLPH HUBNER read an interesting and valuable paper on scientific observation in the interior of Port Natal, at a meeting of the Natural History Association of that colony on the 20th of August.

ON the 8th August Mr. S. Vincent Erskine read a paper before the Natal Natural History Society—Mr. John Robinson in the chair—on the Tsetse Fly. Mr. Erskine severely criticised Dr. Livingstone's statements, and denied that the fly was destructive to the life of the ox, horse, or dog. He affirmed that death was to be attributed more to change of grass or climate. The same evening Mr. Morant read a paper on the Entomology of the Free State and the Trans Vaal, particularly with regard to the butterflies.

THE expedition of Yale College students, under the leadership of Prof. O. E. Marsh, to which we referred last week, spent several months in the Rocky Mountain regions, investigating its flora and fauna, and collecting for the Yale Museum as fine collections as possible of the extinct animal remains found in such abundance in the tertiaries and cretaceous deposits of Nebraska, Dakota, and Wyoming. Leaving this region they will visit California, and after investigating the geology of the Pacific coast, will return through Colorado and Kansas, reaching New Haven, if possible, in November.

### COCOA

COCOA is a valuable article of food that is becoming more and more in use in this country, and judging from the increased importations during the past three or four years, and the constant average of the coffee imports during the same period, it seems that cocoa is, in a measure, displacing coffee as a popular beverage.

The plant producing the cocoa of commerce is a tree seldom growing to a greater height than 17 or 18 feet. It is known to botanists as *Theobroma Cacao*. It bears an oblong fruit, ribbed longitudinally, measuring from six

to ten inches in length and four to five inches across, and, when ripe, is of a yellow colour, changing to brown in drying.

It contains from fifty to one hundred seeds, and these seeds, after being washed, thoroughly dried in the sun, and roasted, form the cocoa-nibs of commerce.

Linnæus must have had a high appreciation of cocoa when he gave to the genus the name *Theobroma*, which is derived from *theos*, god, and *broma*, food, signifying it as food fit for a god. Cocoa contains a large amount of nutritive matter. In this respect it differs in a marked degree from tea and coffee; for while they are taken only in infusion and are used as refreshing beverages, cocoa is usually taken more in substance, and, as such, may be considered both as food and drink.

It was used in very early times in Mexico, whence it was introduced by the Spaniards into Europe about 1520. Humboldt tells us that it was extensively cultivated in the time of Montezuma, and the seeds were commonly used as money by the Aztecs. At the present time the cocoa-tree is largely grown in the West Indies, more especially in Trinidad, and over a great part of tropical America. Numerous varieties of the cocoa tree exist, some producing longer, or broader and some thinner or thicker skinned fruits, others producing larger, longer, or broader seeds, as the case may be. The seeds also vary in quality, according to the variety producing them or the place of their growth: thus Caracacas and Trinidad seeds are considered the finest, and some manufacturers use the names of the best districts as a recommendation to their wares.

The seeds are brought into this country in a dried state, and are roasted in revolving metal cylinders, the heat causes them to shrivel slightly so that the husks or skins are left loose and are removed by fanning. It is said that large quantities of these husks are imported from Italy under the name of "Miserable," and are used in Ireland by the poorer classes. The roasted seeds, after the husks are removed, are known as cocoa-nibs, but they are never seen in commerce in their whole form. The seed naturally divides by its two cotyledons, and in the process of winnowing each cotyledon gets broken into two or more pieces. To obtain the nibs and boil them in the old-fashioned way is certainly the surest way of getting genuine cocoa.

Some trouble, however, attends the preparation of the beverage in this form, the nibs requiring to be boiled an hour or two to extract their valuable properties. To obviate this, and to supply the public with a more convenient article, powdered cocoas, which require simply mixing with cold milk, boiling water being afterwards added, were introduced. These prepared cocoas opened a wide field for wholesale adulteration, the public, by using them, sacrificing purity for convenience in the preparation for the table.

These powdered cocoas are "prepared" by reducing the seeds to a fine paste by grinding them under heavy heated rollers—starch, flour, sugar, molasses, and, in the cheaper kinds, other ingredients less wholesome being added; after which, the whole mass is reduced to powder, packed in different forms, and sold under various trade terms, such as "Homœopathic Cocoa," "Soluble Cocoa," &c. Each manufacturer's individual preparation varies perhaps in flavour, according to the proportion or character of the ingredients added. The numerous forms of cake chocolate are prepared in the same way, vanilla being largely used in the flavouring, and the pasty mass being pressed into moulds instead of being reduced to powder. Rock cocoa and Flake cocoa are likewise prepared in a similar way, but are not so highly flavoured.

Few articles are more liable to adulteration than cocoa; and so many forms or qualities are known in trade, varying in price from 6s. up to 4s. per lb., that it is not surprising that in the cheapest forms the adulterants themselves should be



of the commonest and worst description. If people would only trouble themselves to think that cocoa-nibs, which are simply the roasted seeds without any preparation, are retailed at 1s. 4d. per lb., how can they expect to obtain an equally genuine article in a finely-pulverised state, and packed in tinfoil and a showy outward cover, at the same price? which is what the so-called "Homœopathic" and similarly prepared cocoas are sold at. Expensive machinery in the first place, and the constant wear and tear of the same, the consumption of fuel in the steam apparatus, and the expense of packing, have all to be paid for by the con-

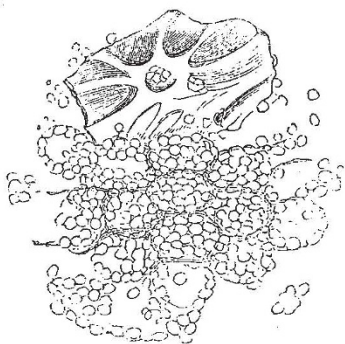


FIG. 1.—Section of Cocoa-Nib as seen under the microscope

sumer, not by charging him a directly higher money price, but by increasing the bulk or weight of the article by adding foreign substances of a much cheaper description, and, which is frequently done in the commoner kinds of cocoa, bad or damaged seeds themselves. There is one thing to be said in favour of our principal cocoa manufacturers, that they seldom advertise these powdered cocoas as genuine; they either leave out that important word altogether or call them "prepared" cocoas, and this word should be borne in mind by those who wish to avoid the prepared and to obtain the real article, and are consequently ready to pay a fair price for such. If it is impossible to procure genuine powdered cocoa at 1s. 4d. per lb.,

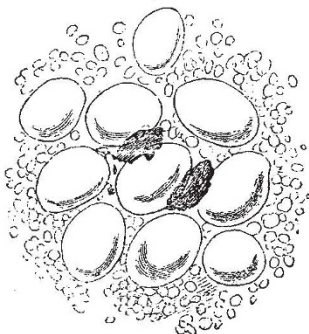


FIG. 2.—"Soluble Cocoa" as seen under the microscope

still more impossible is it at 6d., which is the price paid by the poorer classes for an article called "Soluble Cocoa," sold in  $\frac{1}{2}$  lb. packets at 1s. 6d. each, and largely consumed by them. The very fact of its low price ought to be sufficient to tell us pretty plainly that a very small quantity of cocoa, and that of an inferior description, is to be found in such a packet. It contains a large amount of common fat, the presence of which can be detected by smearing a little on a piece of glass, and can be still more clearly seen on a glass slide under a microscope. The addition of fat adds to the weight, while, to increase the bulk, a very large quantity of starch is added, which is the cause of the thickening of the beverage in the cup. If a little of this so-called cocoa be placed on the tongue and rubbed

against the roof of the mouth, it will be found to grate against the palate, and, moreover, to have a decidedly chalky or earthy flavour. The spoon also grates against the sediment at the bottom of the cup, clearly showing the presence of mineral matter.

Until within the last few years, all these powdered cocoas were more or less "prepared," so that pure cocoa could not be obtained in this convenient form. An article, called "Cocoa Essence," recently introduced, has, however, dispelled this notion. We all know that the cocoa-seed naturally contains a large quantity of butter or fat (about 50 per cent.) which makes it too rich or heavy a beverage for many persons, and this more especially when we consider that other elements of nutrition, such as albumen, are also present. To deprive it entirely of its butter would be to take away one of its valuable principles; but it is possible to have too much of a good thing; therefore, by taking away about two-thirds of the butter the cocoa itself is not only improved in a dietetical point of view, but the addition of sugar, arrowroot, &c., is rendered unnecessary to take up or balance the fatty portion. Those who wish for pure cocoa in a convenient form should therefore obtain the "Cocoa Essence." It is sold in 3oz. packets at 6d. each. A small spoonful is sufficient for one cup, and, unlike the "Homœopathic," "Soluble," and other similar cocoas, it is not mixed with milk, but with a little boiling water, and stirred for a second or two until it is

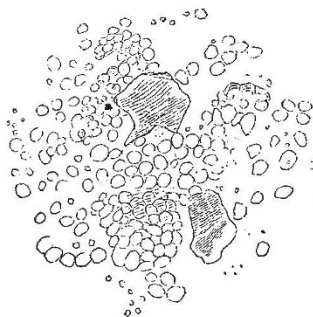


FIG. 3.—Microscopical appearance of "Cocoa Essence"

dissolved into a fine paste, the cup is then filled with boiling water, and milk and sugar added to please the taste. As no sugar is used in the manufacture of this article, it requires the addition of a larger quantity than any of the so-called prepared cocoas, and as no starch enters into its composition, the beverage is as clear as a cup of well-strained coffee. It is quite as portable as any of the packet cocoas, and as easily mixed. Its extra cost, in the first instance, is fully compensated by its purity, and by the fact that a smaller quantity is required for each cup. It is, moreover, a proof of the extensive adulteration of those kinds which are retailed at 1s. 4d. or 1s. 6d. per lb.

To such an extent has the public palate been led to prefer the flavour of many adulterated articles to that of the genuine, that we believe a great proportion of those who take cocoa really do prefer the thickened soup-like preparation made from the highly-flavoured and doctored sorts to an infusion of the pure seeds. If such people would think for one moment why and for what purpose they take this or that kind of food, and what are the properties and effects on the system of the articles they are supposed to consume, and what those of the articles they actually do consume, a much better state of things might be brought about, for, pending the appointment of a public analyst, the head of every household might make himself analyst to his own family, and so see that he does not get cheated either in pocket or health.

JOHN R. JACKSON