

'A definition of ginger recommended by the United States Food Standards Committee, is as follows:—Ginger is the washed and dried or decorticated and dried, rhizome of *Zingiber Zingiber* (L.) Karst., and contains not less than forty-two (42) per cent of starch, not more than eight (8) per cent of crude fibre, not more than six (6) per cent of total ash, not more than one (1) per cent of lime, and not more than three (3) per cent of ash insoluble in hydrochloric acid.'

'Limed ginger, bleached ginger, is whole ginger, coated with carbonate of lime, and contains not more than ten (10) per cent of ash, not more than four (4) per cent of carbonate of lime, and conforms in other respects to the standard for ginger.'

The British Pharmacopoeia describes ginger as 'The scraped and dried rhizome of *Zingiber officinale*, Roscoe'; and gives the physical characters of the rhizome; but does not mention ground ginger, nor attempt any enumeration of chemical characters. (Edn. 1898). Squire's Companion (Edn of 1908) gives the following tests for ginger:—The cells contain resin, (and) pyriform compressed starch grains 12 to 40 micm. long, appearing linear when seen laterally, having the hilum at the smaller end; thin walled, polyzonal parenchymatous cells, and sometimes septate bast fibres with irregularly nodose extremities. When unbleached yields 3 to 4 per cent ash, and 5 per cent should not be exceeded. Not less than 1.5 per cent soluble ash. Extractive matter to cold water usually about 10 per cent and should not be less than 8.5 per cent; the extractive matter soluble in 90 per cent alcohol usually amounts to about 5 per cent and should not be materially below this figure.'

It is apparent, from these citations, that we have but a very vague and indefinite knowledge of ginger, and it may be well to synoptize the main points brought out by the research work reported in the bulletins from this laboratory.

Bulletin No. 40 contains photomicrographic reproductions of genuine and adulterated gingers, magnified 225 diameters, and seen under polarized light. The differences between ginger starch, and such starches as are commonly employed in adulteration of ginger, are well shown.

A synoptical table of published results in the chemical examination of ginger is furnished, and the following conclusion reached. 'An examination of these results shows that no single component of ginger is sufficiently constant in amount to make the identification of a sample as genuine possible by its means.'

Analytical numbers concerning 98 samples include moisture, cold water extractive, total ash; and in certain cases, petroleum ether and alcohol extractive, soluble ash, and alkalinity of ash.

Samples are only condemned as adulterated where foreign starch in amount exceeding 10 per cent is found.

Bulletin No. 95 reports only 10 samples of ginger; giving moisture, cold water extractive and results of microscopic examination. One sample is condemned as containing wheat starch. Three others are called in question as giving only 14.1, 15.3, and 14.9 per cent extractive to cold water. These probably contain exhausted ginger, since similar extraction of genuine samples afforded nearly or quite 20 per cent of extractive. But it would be safer to describe these samples as 'doubtfully genuine' than as adulterated.

The details for cold water extraction of ginger are given (pp. 24 and 25), and the analyst adds:—'I have not met with an authenticated sample of ginger which gave less than 19 per cent of extractive to cold water, when treated as described.'

Bulletin No. 137 reports upon 30 samples, of which 29 appear to be genuine, as judged by microscopic characters, and the cold water extractive, carried out by the process described above. Extraction amounts to above 20 per cent by weight on the dry ginger, in most samples, and in several reaches 24 per cent.

A consideration of all work recorded for ginger leads to the conclusion that microscopic examination and determination of cold water extractive are quite the most valuable tests that can be applied to the ground ginger of commerce. Deter-