Due to the volatile nature of the essential oils of onion and garlic, the constituents may enter the blood from the respiratory as well as from the digestive tract. A rapid transfer of these substances from the blood to the fat of the milk takes place in the udder. Ordinary ingestion of the plants permits the acquisition of the onion or garlic substances by the blood through both channels.

In recent experiments at the University of Tennessee, the administration of fresh wild garlic tops was limited to inhalation of the volatile substances. Under these conditions, strong garlic flavor and odor were detected in the blood and milk in a very short time. When, however, the administration was so arranged as to eliminate as far as possible the inhalation factor, the time required for the acquisition of the garlic flavor and odor by the milk was greatly increased and the intensity markedly diminished.

It is evident from the results obtained in these experiments that of the two modes of entrance of garlic into the blood, inhalation is many times more effective. Under ordinary conditions this factor can not be eliminated nor can it be controlled by feeding.

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QUOTATIONS

THE CONTROL OF MALARIA

AN important development in the control of malaria is announced by the Ross Institute and Hospital for Tropical Diseases. A new organization of the Ross Institute Industrial Anti-Malarial Advisory Committee has been set up to assist tropical industries in combating the disease. One of the technical members of the committee will be Sir Malcolm Watson, who, after many years of active malarial control work in the Malay States, has joined the Ross Institute as principal of its malarial control department. The others will be the three directors of the institute—Sir Ronald Ross, Sir William Simpson and Sir Aldo Castellani. The lay members of the committee will represent the Indian Tea Association, the Rubber Growers' Association and other Indian and African iron, mining, jute and cotton companies. The antimalarial staff at the institute will be at the disposal of these companies for advice, and will study their medical reports and receive and advise their physicians. It is intended that Sir Malcolm Watson himself shall visit some part of the tropics every year for a short period. The past twenty-eight years' work in Malaya has shown that research has been benefited so much by malaria control and the work so much from research that it is considered advisable to associate research and active malaria control work as closely as possible in the future. The study of malaria in Malaya has shown how it varies with the physical features of the land and the species of anopheles inhabiting it. Even in a country so small as the Malay Peninsula malaria is associated with various zones of land (*e.g.*, salt water, mangrove swamps, fresh-water coastal swamps, the ravines of coastal hills, the inland plains, the inland hills) in certain definite ways, depending on whether or not the virgin jungle is intact or destroyed. That gave ten types of land which had to be studied. In addition, rice fields of three types were discovered, giving a total of thirteen different types of land. Some twenty-one different species of anopheles had to be classified in the laboratory and studied in the fields. It was found that probably only four or five were associated with the spread of malaria on any considerable scale and therefore expenditure on the control of others was unnecessary. The methods devised for the control of malaria had to vary widely; in some places there was strict preservation of jungle, and in others elaborate engineering schemes, the application of larvicides, drainage or flooding. In India, malaria is associated with other types of land, *e.g.*, the tanks surrounding villages in the great plains, the rivers and hills of the Assam valleys, and the wells in large cities. Enormous sums of money have been saved to the governments and industrial undertakings in Malaya by the control of malaria. It is certain that there will be an increasing demand for control by both the governments and industrial undertakings in other countries. Without trained research medical officers and expert engineers, the attempt to control malaria will be unduly expensive, and in many cases will fail. The lesson was a dearly bought one in Malaya. The Ross Institute Industrial Anti-Malarial Advisory Committee, with local branches in various countries, is Sir Ronald Ross's solution of this problem.—*The Journal of the American Medical Association.*

PROTOCHLOROPHYLL

PRINGSHEIM[1] assumed alcohol extracts of etiolated seedlings to have a yellow pigment which he called *etiolin*. The spectrum of etiolin showed in addition to the absorption bands characteristic of chlorophyll, a band between $\lambda = 640$ and 620 $\mu\mu$. Monteverde[2] made an exhaustive study of alcohol extracts of etiolated seedlings and found the absorption band observed by

1 Monatsber. d. kgl. Akad. d. Wiss. zu Berlin, Okt. 1847, Sep. p. 6.

2 Acta Horti Petropolitani 13, Nr. 11, p. 210, 1894.

Pringsheim to be due to a peculiar red-fluorescing pigment, usually masked by the yellow pigments, which he called *protochlorophyll.* Liro[3] observed that absolutely dark-grown seedlings do not have the etiolin-spectrum of Pringsheim unless they are exposed to the light for a few seconds or minutes, and rightly concluded that etiolin is a mixture of the protochlorophyll of Monteverde and chlorophyll.

Liro made an extensive study of the formation of chlorophyll in the phanerogams and concluded that protochlorophyll is a postmortal decomposition product of a colorless organic substance which develops in the dark, and is designated, after Sachs,[4] as *leucophyll.* According to Liro, leucophyll decomposes to form protochlorophyll in cells that are killed, and changes photochemically into chlorophyll upon exposure to light. Protochlorophyll may be observed in living leaves, but Liro assumed this to be due to occasional dead cells in which the leucophyll has undergone decomposition. In support of this view Liro reports that a layer of five or more living leaves of etiolated seedlings of *Avena sativa, Triticum sativum* or *Sinapis alba* was necessary, when examined spectroscopically, for the detection of the absorption band characteristic of protochlorophyll, but after the leaves were killed by dipping them in boiling water a single leaf or a layer of only two leaves was sufficient to give an evident protochlorophyll spectrum. It is assumed that in killing the cells the protochlorophyll is formed as a decomposition product of leucophyll. This conclusion is contradicted by practically all the experiments in Liro's paper, as he claims that leucophyll changes quantitatively into chlorophyll in etiolated leaves upon exposure to light even though the cells have been killed in any manner whatsoever, as by freezing, by immersing in boiling water, by exposing to ether vapors, by drying, by grinding to a paste in a mortar. Leucophyll has never been extracted from plants, though Liro tried many substances as solvents. His conclusion is that the leucophyll was either destroyed by or was insoluble in each of the substances tried.

The presence in plants of leucophyll, in the sense of Liro, is entirely hypothetical. That protochlorophyll is a decomposition product of some other organic substance seems highly improbable in the light of recent studies on the formation of chlorophyll made in the Botanical Institute of the University of Erlangen, Germany. It has been found that absolutely dark-grown seedlings of *Zea Mays* and *Avena sativa* contain only protochlorophyll when extracted in the dark, protochlorophyll and chlorophyll when extracted in red light in the dark room, and only chlorophyll when extracted in diffuse daylight in the laboratory. The relation of protochlorophyll to chlorophyll is always quantitative, and as the amount of protochlorophyll decreases under the influence of light the amount of chlorophyll increases. Protochlorophyll is changed into chlorophyll by red light which has no photochemical effect on orthochromatic photographic emulsions. As found by Liro, red light is about twenty times as effective as blue light in converting protochlorophyll (leucophyll, according to Liro) into chlorophyll. In daylight protochlorophyll changes quantitatively into chlorophyll very rapidly. Etiolated seedlings of *Avena sativa,* which had been air-dried in the dark-room and stored in a covered box in the laboratory for approximately one year, were extracted in the light and were found to contain protochlorophyll and magnesium-free protochlorophyll, but no chlorophyll. Protochlorophyll in ether solution does not change to chlorophyll when exposed to light.

Dr. Noack, of the Botanical Institute of the University of Erlangen, has made preparations of pure protochlorophyll, and established its chemical relationship with a similar pigment which occurs in the gall of animals.

From the results of the studies briefly referred to above, protochlorophyll is not a decomposition product of some other organic substance, as leucophyll, but is a pigment which develops without the influence of light and changes photochemically into chlorophyll upon exposure to light. It is probable that this change occurs only in the presence of a specific enzyme.

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[3] Annales Academiae Scientiarum Fennicae, Ser. A, Tom. 1. 1909.

[4] *Lotos,* 1859.

INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE OPINIONS 98 TO 104

THE undersigned has the honor to invite the attention of the zoological profession to the fact that Opinions 98 to 104 have been published by the Smithsonian Institution.[1] The summaries read as follows:

Opinion 98. Rigidly construed, Brauer and Bergenstamm (1889 to 1894) did not fix the types for the older generic names, except in the cases where they distinctly state that the species mentioned is the type of the genus.

[1] *Smithsonian Miscellaneous Collections,* 73; No. 5, pp. 1–28.