2705 pellets, a difference significant at the .001 level of confidence. The ratio of number of fecal pellets per gram of food consumed gives a similarly significant difference.

It was daily observed that the extrahandled animals exhibited much more activity and curiosity than the unhandled group. The extrahandled animals spent more time scampering about their cages and watching other activity going on. The unhandled animals generally sat in one position for long periods of time, often facing a corner of the cage.

In our second experiment, 36 male weanling animals of the Sprague-Dawley strain were distributed at random from previously weight-segregated groups; consequently, the average initial weight in each group was the same. Using Sprague-Dawley rats should indicate whether or not a species difference in reactivity exists and whether or not it is possible to obtain the same physiological differences with rats that are not necessarily litter mates. In general, our findings substantiated those in our first experiment, with one exception: the unhandled animals of the Denver University strain drank significantly more water than the extrahandled animals of the same strain. We were unable to repeat this finding with Sprague-Dawley rats in our second and third experiments.

In a third experiment, 48 male Sprague-Dawley weanling rats were randomly divided into four groups: a handled group, individually caged; a handled group, with three animals to a cage; an unhandled group, individually caged; and an unhandled group, with three animals to a cage. The size of the cages of the grouped animals was approximately 3 times that of the individual cages. Again, our data indicate that the findings in our first experiment can be substantially repeated, whether the animals are individually caged or caged in groups. A direct comparison between the extrahandled animals caged individually and those caged in groups of three is not possible at this time, since two investigators were involved.

The increased growth and better utilization of food observed for the extrahandled animals indicated a possible difference in the thyroid activity of these two groups. It is fairly obvious that our findings cannot be a function of differences in the amount of exercise received, since the unhandled animals were much less active and should, by this reasoning, have gained more weight. Our data (Table 1) show that in all three of our experiments, the thyroids of the unhandled animals were in a more active state than those of the extrahandled animals, as indicated by the differences in percentages dose uptake of $I^{131}$ ($P = .001$). This increased thyroid activity on the part of the unhandled animals, whether or not it is a function of differences in anxiety level, may well be an important mediating factor in the production of the observed differences in growth and food utilization. Comparable studies of other endocrine functions are indicated for further clarification of the psychophysiological relationships involved.

Table 1. Comparison of the thyroid activities of extrahandled and unhandled laboratory rats. Two investigators (A and B) performed the experiments with handled (H) and unhandled (U) rats.

| | No. animals per group | Avg. percentage dose $I^{131}$ taken up by thyroids | | | |
|---|---|---|---|---|---|
| | | A-H | A-U | B-H | B-U |
| Test 1 | 10 | 3.48 | 3.93 | 3.21 | 3.94 |
| Test 2 | 12 | | | 3.20 | 3.51 |
| Test 3 | 12 | 2.60 | 3.80 | 2.97* | 3.32* |

* The animals in these tests were housed three animals to a cage.

### References and Notes


* Now at Veterans Administration Hospital, Syracuse, New York.
1. L. Bernstein, *Psychol. Bull.* **49**, 38 (1952).
2. O. Weininger, *Science* **119**, 285 (1954).


24 March 1954.

## Occurrence of Both Caoutchouc and Gutta in Additional Plants


**H. M. Leeper and Walter Schlesinger**

*Wm. Wrigley Jr. Company, Chicago 11, Illinois*


Since it was reported that chicle (the resinous exudate of *Sapota achras*) contains both caoutchouc and gutta (*1, 2*), the question has been raised whether other plants also produce both cis- and trans-polyisoprene. Examination of samples of about 50 coagulated latexes from other lactiferous trees has revealed several other examples of the presence of both of these polymers. They are shown in Table 1, together with other pertinent data on the samples.

The procedures used in the analysis were similar to those previously reported for the separation of caoutchouc and gutta from chicle (*2*). A 10- to 15-g sample of the coagulated latex was dried at 60°C under vacuum. The dried sample was weighed into a tared extraction thimble and extracted in a Soxhlet extractor with reagent-grade acetone for 48 hr. The thimble was then dried at 60°C under vacuum, usually overnight, and reweighed. From the loss in weight, the percentage of acetone solubles was calculated.

The dried, extracted, acetone-insoluble residue, together with portions of the extraction thimble adhering to it, was suspended in 40 ml of benzene and allowed to stand at approximately 25°C for 48 hr. It was then heated to 35°C for a few minutes and centrifuged. The clear supernatant was decanted; 80 ml of ethyl acetate was added to it, and the mixture was allowed to crystallize overnight in the refrigerator at 5° to 10°C. Gutta separated as a white or off-white precipitate. It was filtered, air-dried, and weighed. The yield of gutta was calculated from this figure.

To the benzene-ethyl acetate filtrate from the pre-

Table 1. Analysis of several resinous exudates.

| Native designation | Region from which obtained | Botanical designation | Acetone soluble* | Acetone insoluble* | Caoutchouc* | Gutta* |
|---|---|---|---|---|---|---|
| Chakun | Bang-bao (Siam) | *Mimusops* sp. | 77.6 | 22.4 | 0.59 | 13.7 |
| Chakun | Bang-bao (Siam) | *Mimusops* sp. | 71.9 | 28.1 | .25 | 16.9 |
| Chakao | Tapet (Siam) | *Palaquium* sp. | 66.4 | 33.6 | .70 | 10.6 |
| Chikhao | Thapet (Siam) | *Palaquium* sp. | 73.4 | 26.6 | .23 | 10.4 |
| Masang | Huay-rai (Siam) | *Mimusops* sp. | 76.2 | 23.8 | .02 | 15.7 |
| | Huay-rai (Siam) | | 72.6 | 27.4 | .09 | 16.7 |
| | Prae (Siam) | | 74.6 | 25.4 | .52 | 18.1 |
| Khanun-nok | Khlung (Siam) | *Palaquium obovatum* | 75.9 | 24.1 | 1.30 | 6.4 |
| | Khlung (Siam) | | 68.0 | 32.0 | 3.7 | 20.9 |
| | Traat (Siam) | | 65.1 | 34.9 | 4.5 | 21.5 |
| White Nato | Davao Penal Colony, P. I. | *Palaquium* sp. | 54.9 | 45.1 | 1.9 | 41.8 |
| Red Nato | Davao Penal Colony, P. I. | *Palaquium* sp. | 56.0 | 44.0 | 3.6 | 41.5 |
| Malak-malak | Macum, Tagum Davao, P. I. | *Palaquium philippense* | 63.4 | 36.6 | 2.0 | 18.5 |
| Kalipayia Colorado | La Brea, P. I. | *Palaquium ahernianum* | 55.1 | 44.9 | 1.5 | 31.9 |
| Kalipayia Blanca | La Brea, P. I. | *Palaquium ahernianum* Merrill | 61.1 | 38.9 | 6.6 | 17.5 |
| Lokosdulian | Lituban, P. I. | *Palaquium* sp. | 56.8 | 43.2 | 1.5 | 32.4 |

* Percentage of dried coagulated latex obtained from the plant.

cipitation of the gutta was added dropwise, with stirring, an equal volume of methanol (120 ml) containing a trace of sodium iodide. After standing overnight, the sticky mass of caoutchouc was separated by decantation or filtration, whichever was more practical. The caoutchouc was dried under vacuum at 60°C and weighed. The yield was calculated from this weight.

The data presented show that chicle is not a unique plant exudate in having both cis- and trans-polyisoprene (caoutchouc and gutta). Several species of the genera *Palaquium* and *Mimusops* were found to yield latexes containing both hydrocarbons.

The authors' thanks and appreciation are due to Llewellyn Williams of the L. A. Dreyfus Company, Oak Tree, N.J., for collecting and transmitting the samples, and to the Wm. Wrigley Jr. Company for permission to publish these data.

### References

1. W. Schlesinger and H. M. Leeper, *Science* **112**, 51 (1950).
2. ———, *Ind. Eng. Chem.* **43**, 398 (1951).

12 March 1954.

# Communications

## Duration of Infectivity of the Virus of Silkworm Jaundice

Insect viruses contained within polyhedral inclusions are known to be remarkably resistant to the effects of drying and other adverse environmental conditions. In the literature, such viruses have been variously reported as viable for "months," "years," "several years," and so forth. Bolle, in 1907 [*Z. landwirtsch. Versuchsw. Deut. Oesterr.* **10**, 233], made the rather cryptic statement: "Es verdient hier die konstatierte Tatsache besonders hervorgehoben zu werden, dass nämlich das Infektionsvermögen der polyedrischen Körnchen selbtst bei über 25 Jahre altem Infektionsmaterial unverändert erhalten wird." Recently I had the opportunity to test experimentally the infective capacity of a lot of silkworm-jaundice virus (*Borrelina bombycis* Paillot) stored for a period of 15 yr.

In 1948, through the kindness of N. R. Stoll, I obtained a number of flame-sealed glass tubes of the silkworm-jaundice virus that had been prepared in 1939 by the late R. W. Glaser of the Rockefeller Institute for Medical Research. The tubes were filled with polyhedra-containing hemolymph, and have been stored at room (23°C) and refrigerator (4°C) temperatures, mostly the latter.

On 8 Sept. 1953, the contents of one of the tubes was fed on mulberry leaves to healthy silkworm larvae [*Bombyx mori* (Linn.)]. Within 5 to 7 days, two of the three test larvae died with typical jaundice symptoms, and large numbers of polyhedra were observed in their body contents. A control group of at least 100 silkworms remained healthy.

Again, on 30 Apr. 1954, silkworm larvae were fed mulberry leaves contaminated with suspensions of polyhedra drawn from diseased silkworms 15 yr previously. Twenty-five of the 30 test larvae succumbed with symptoms typical of silkworm jaundice. None of the 25 control larvae showed any signs of infection.