## Structure of Sterculic Acid

IN 1952, Nunn<sup>1</sup> put forward a structure for sterculic acid (I), whereas we have assigned to it structure  $(II)^2$ ; Dijkstra and Duin<sup>3</sup> have, however, rejected structure (II) on grounds which we believe to be inconsistent with the known facts.

$$CH_{3} - (CH_{2})_{7} - C = C - (CH_{2})_{7} COOH$$

$$(I)$$

$$CH_{3} - (CH_{2})_{6} - CH - CH - CH = CH - (CH_{2})_{7} COOH$$

$$CH_{2}$$

$$(II)$$

(1) Derfer et al.<sup>4</sup> have found that the derivatives of cyclopropane exhibit an infra-red absorption band in the region 1,000-1,020 cm.-1; consequently, they have suggested that a band near 1,010 cm.-1 may be used for detecting the presence of a cyclopropyl group in a compound.

A cyclopropane ring conjugated with a C=C bond (vinyl-cyclopropane) has been found by Van Volkenburgh et al.<sup>5</sup> to possess a band at 1,010 cm.<sup>-1</sup>. As our value for sterculic acid is 1,004 cm.<sup>-1</sup> (our revised value<sup>6</sup> being 1,008 cm.<sup>-1</sup>), which is very close to the value of the conjugated compound cited above, a similar type of structure is not unlikely in sterculic acid. Recent work carried out in this laboratory<sup>8</sup> has shown that the bands of the similar cyclopropane and cyclopropene derivatives prepared synthetically lie almost in the same region, and no analytical value could be set for characterizing a cyclopropene group.

(2) Besides cotton seed oil, the Halphen reaction is given by many other seed oils, which according to their reported analyses do not contain even a trace of any fatty acid having a cyclopropene group. Further, the exact mechanism of the reaction and nature of the chromogenic substance are not yet settled; possibly some component of the nonsaponifiable matter present in the oil is concerned with this colour reaction. In view of this, it is difficult to accept that the reaction is due to the cyclopropene grouping alone.

(3) The view that a cyclopropane group is less reactive than an ethylene bond is not corroborated in many cases'. Cyclopropane and its derivatives have been reported<sup>8</sup> to possess appreciable instability and resemble closely the corresponding olefinic compounds in their reaction to heat and some reagents. Thus there does not seem to be any marked fundamental difference between the corresponding derivatives of cyclopropane and ethylene, and a cyclopropane ring conjugated with a C=C or any other classically unsaturated group behaves very similarly to a typical diene conjugated system<sup>7,9</sup>. It has also been reported<sup>9</sup> that cyclopropane and cyclobutane are unstable relative to the isomeric alkenes.

On the other hand, the cyclopropene derivatives are not so unstable as Dijkstra and Duin<sup>3</sup> have indicated. Their comparative stability and semi-aromatic character were demonstrated by Goss, Ingold and Thorpe<sup>10</sup> so early as 1923. Further, the work carried out in this laboratory<sup>6</sup> on the syntheses of cyclopropene compounds has shown that they are

fairly stable, so much so that they could be vacuumdistilled without decomposition. It may be added that the comparative study of the polymerization of sterculic acid and 9:11-octa-decadienoic acid has not so far been reported, but it is well known that dehydrated castor oil, in which the glyceride of the latter is present to the extent of only 25 per cent, gels at ordinary temperature after some time.

Finally, a strong argument against the structure (I) proposed by Nunn<sup>1</sup> is that the compound of this constitution has been synthesized and proved to be different from sterculic acid as already reported<sup>2,6</sup>. Dijkstra and Duin<sup>3</sup> have isolated an unknown

C18-fatty acid from kapok seed oil and assume it to contain a cyclopropene group, thus leaving a straight chain of 17-carbon atoms (odd number); this is unique and merits careful investigation.

The chemical and analytical data giving further evidence for structure II will shortly be published elsewhere.

J. P. VERMA BHOLA NATH J. S. AGGARWAL

National Chemical Laboratory of India,

## Poona 8.

Sept. 14.

- <sup>1</sup> Nunn, J. R., J. Chem. Soc., 313 (1952).
- <sup>2</sup> Verma, J. P., Nath, Bhola, and Aggarwal, J. S., Nature, 175, 84 (1955).
- <sup>2</sup> Dijkstra, G., and Duin, H. J., Nature, 176, 71 (1955).
- <sup>b</sup> Derfer, J. M., Pickett, E. E., ard Boord, C. E., J. Amer. Chem. Soc., 71, 2482 (1949).
  <sup>5</sup> Volkenburgh, R. V., Greenlee, K. W., Derfer, J. M., and Boord, E. C., J. Amer. Chem. Soc., 71, 3595 (1949).
  <sup>6</sup> Verma, J. P., Das Gupta, S., Nath, Bhola, and Aggarwal, J. S., J. Ind. Chem. Soc. (in the press).
- <sup>9</sup> Gilman, H., "Organic Chemistry", 1, 36 (Wiley, New York. 1959).
  <sup>6</sup> Noller, C. B., "Organic Chemistry", 559 (Saunders, London, 1951).
  <sup>9</sup> Royals, E. E., "Organic Chemistry", 213, 219 (Prentice-Hall, New York, 1954).
- <sup>19</sup> Goss, F. R., Ingold, C. K., and Thorpe, J. F., J. Chem. Soc., 123, 327 (1923).

## **Humidity and Corrosion**

I SHOULD like to support and emphasize Dr. J. C. Hudson's comments on Major P. A. Cartwright's communication in Nature of October 15, p. 748. As the figures (obtained at the Ministry of Supply Tropical Testing Establishment, Nigeria ; see Ambler and Bain, J. App. Chem., 5, 437 (1955) ) in the table below show, corrosion at two sites of roughly equal humidity may range from 'highest anywhere' to less than in rural Britain, the operative variant being salinity.

	R.H. (per cent)		Corrosion of mild steel	Salinity (sodium chloride
	Av. max.	Av. min.	month)	damp surface : mgm./m. <sup>2</sup> /day)
Lighthouse Beach, Lagos, 50 yd. from H.W.M.	94	78	5.6	800
Jungle clearing at Nkpoku, 30 miles from sea	95	80	0.10	7.5

H. R. AMBLER

Chemical Inspectorate, Station Approach Buildings, Kidbrooke, London, S.E.3.