

lene with oxygen had about the same effect on the erythrocyte fragility. When ethylene was pushed to asphyxiation after 20 minutes without oxygen, the osmotic resistance of the red cells was reduced to a considerable extent in the lower dilutions of the hypotonic Simmel's fluid (0.4%), but in the higher dilutions (0.7% and 0.6%) it was only slightly below the normal levels.

3711

**Effects of Anesthetics on Osmotic Resistance of Erythrocytes:  
III. Carbon-Dioxide with Oxygen.**

C. D. LEAKE, HARRY LAPP, JANE TENNEY AND R. M. WATERS.  
(Introduced by C. L. A. Schmidt.)

*From the Pharmacological Laboratories of the University of Wisconsin and the University of California.*

A mixture of 25% carbon-dioxide with 75% oxygen was administered to dogs without rebreathing. This greatly increased the

**TABLE I.**  
*Showing sample but typical effects of general anesthetic agents on the osmotic resistance of erythrocytes to hypotonic saline solutions as tested by Simmel's technique.*

Anesthetic status of animal	Percentage of total red blood cells remaining after 1 hour's exposure to:			
	70% of isotonic Simmel's fluid	60% of isotonic Simmel's fluid	50% of isotonic Simmel's fluid	40% of isotonic Simmel's fluid
Dog 3: Normal, before anesthesia 15 minutes under ether 40 minutes under ether	90	73	36	30
	90	82	41	30
	78	66	28	8
Dog 11: Normal, before anesthesia 15 minutes under chloroform 35 minutes under chloroform	87	80	62	12
	84	58	23	3
	70	63	21	5
Dog 16: Normal, before anesthesia 20 minutes under nitrous-oxide administered with oxygen	94	66	53	22
	88	59	44	12
Dog 19: Normal, before anesthesia 15 minutes under ethylene administered with oxygen 5 minutes later, during which interval 25% carbon-dioxide with 75% oxygen were administered	84	79	61	57
	74	73	50	46
	86	86	80	47

amplitude of respiration and induced anesthesia with abolition of the corneal reflex in 6 minutes. The pulse was greatly retarded. The mucous membranes remained pink. Clonic convulsions initiated by tremors came on within 10 minutes after induction, and violent tetanic convulsions quickly followed. Upon administering pure oxygen the convulsions promptly stopped, the pulse became very rapid, and the animals recovered. In all cases, except in the weaker dilutions (0.4%), the resistance of the erythrocytes to hypotonic Simmel's solutions was greater than normal.

After the administration of CO<sub>2</sub>, much difficulty was experienced in obtaining blood because of the rapid clotting. Hickman noted this action of carbon-dioxide a century ago. Dr. Cline Chipman of Washington, D. C., has observed clinically that a few breaths of carbon-dioxide administered during the anesthetic period will greatly shorten the coagulation time of blood. This has been confirmed by Dr. R. M. Waters of Madison, Wis., and by Dr. M. E. Botsford and Dr. M. J. Price of San Francisco. Such an effect of carbon-dioxide may be of great clinical value in certain cases of capillary oozing at operation. Some phases of the relation of the CO<sub>2</sub> content of blood to its coagulation time have recently been studied by Baumberger.<sup>1</sup>

---

<sup>1</sup> Baumberger, J. P., *Arch. Internat. Physiol.*, 1926, xxvii, 86.

### 3712

#### Are the Protozoan Faunae of Termites Specific?

S. F. LIGHT AND MARY F. SANFORD. (Introduced by C. A. Kofoid.)

*From the Department of Zoology, University of California.*

The species of the lower families of termites, so far investigated, have each a characteristic hindgut fauna of flagellate Protozoa, belonging to the orders *Hypermastigida* and *Polymastigida*. All individuals of a given termite species over wide geographic ranges present, so far as known, a similar grouping of species. This raises the question whether we are dealing here with specific protozoan faunae, whose species are able to exist only in the one specific termite host, with which they have established obligatory physico-chemical relations, or whether the faunae are distinct because of the isolated habit of life of the termite colony.

A colony of *Porotermes froggatti* received in normal condition, but which an examination of nearly 100 intestines showed to have