Mr. ELLIOTT asked Dr. LEEDS if he knew the composition of the material insoluble in water, which he had found in condensed milk, and Dr. LEEDS replied that he had not yet completed the analysis. To a further inquiry of Mr. ELLIOTT, Dr. LEEDS remarked that he had not made any tests for gelatine in condensed milk.

Dr. DOREMUS remarked that one of the first things to decide in this question of adulteration is, "What is adulteration?" and discussed at some length the matter of alum baking powder, claiming that at the present time there is no proof that they are unwholesome.

Dr. E. R. SQUIBB remarked that he looked upon the matter from a different standpoint than most chemists, and would punish as a fraud anything that was sold and not found as represented. He condemned in strong terms the sale of quack medicines, and remarked that the American people take from five to six times as much medicine, *per capita*, as any other nation.

Mr. EIMER also made some remarks upon the enormous quantities of patent medicines sold in the United States.

On motion, the meeting was adjourned.

ARTHUR H. ELLIOTT,
Recording Secretary, pro tem.

XVII.—ON THE COMPOSITION OF ELEPHANTS' MILK.

BY CHARLES A. DOREMUS, M.D., Ph.D.

(Read before the American Chemical Society June 3d, 1881.)

Noticing the recent advertisement in this City regarding the "baby elephant." it occurred to me that perhaps no analysis of the milk of this species of the mammalia had been recorded. This I found corroborated, for though the milk of many animals had been subjected to analysis, no opportunity had ever presented itself to obtain elephants' milk.

Through the courtesy of Mr. Jas. A. Bailey, I was enabled to procure samples of the milk on several occasions.

On March 10th, 1880, the elephant Hebe gave birth to the female calf America. Hebe is now twenty-eight years old, and the father of the calf, Mandrie, thirty-two. Since the birth of the "baby," the mother has been in excellent health except during about ten days, when she suffered from a slight indisposition which soon left her.

When borne the calf weighed 213½ pounds, and in April, 1881, weighed 900 pounds, a very fair year's growth on a milk diet. At the time I procured the samples, both mother and calf were in fine health.

To obtain the milk was a matter of some difficulty. The calf was constantly sucking; nursing two or three times an hour, morning, noon, and night. The milk could be drawn from either of the two teats, but only in small quantities. The mother gave the fluid freely enough apparently to her infant, but sparingly to inquisitive man, so the ruse had to be resorted to of milking one teat while the calf was at the other.

When I first examined the specimens they seemed watery, but, to my surprise, on allowing the milk to stand, I could not help wondering at the large percentage of cream.

The following represents approximately the daily diet of the mother: 3 pecks of oats, 1 bucket bran mash, 5 or 6 loaves of bread, ½ bushel of roots (potatoes, etc.), 50 to 75 pounds of hay, and 40 gallons of water.

Elephants eat continually, little at a time, to be sure, but constantly picking. This habit is also observable in the way the calf nurses. The first specimen of milk was procured on the morning of April 5th, the second on the 9th, and the 3d on the 10th.

The last exceeded the others in quantity, and would therefore be the fairest of the three. It took several milkings to get even these, for the calf would begin to nurse, then stop, and when she stopped, the flow of milk did also.

I was assured by Mr. Cross and the keeper, Mr. Copeland, that the milk I obtained had all the appearances of that drawn at various times since the birth of the calf. Mr. Cross, when in Boston, compared the milk with that from an Alderny cow, and found the volume of cream greater.

I endeavored to have the calf kept away from the mother for some hours, but could not, since she is allowed her freedom, worries under restraint, and besides has never been taken from the mother. The calf picked at oats and hay, but was dependent on the mother for nourishment.

It would have been a matter of great satisfaction to me had I been able to obtain a larger quantity of the milk, or to have gained even an approximate knowledge of the daily yield, but was obliged to content myself with what I could get. By comparing several samples, however, a just conclusion regarding the quality was found.

The analyses of the samples gave the following results:

	I. April 5th. MORNING.	II. April 9th. NOON.	III. April 10th. MORNING.
Quantity	19 c.c.	36 c.c.	72 c.c.
Cream	52.4 vol. %	58	62
Reaction	Neutral.	Slightly alkaline.	Slightly acid.
Sp. gr	....	....	1023.7
	In 100 parts by weight:		
Water	67.567	69.286	66.697
Solids	32.433	30.714	33.303
Fat	17.546	19.095	22.070
Solids not fat	14.887	11.619	11.233
Casein	14.236	3.694	3.212
Sugar		7.267	7.392
Ash	0.651	0.658	0.629

Ten grams were taken for analysis, and in No. III duplicates were made. It is evident from these analyses that the milk approaches the composition of cream, yet it did not have the consistency of ordinary cream. A cream even raised upon it. Under the microscope the globules presented a very perfect outline, and were beautifully even in size and very transparent. The cream rose quickly, leaving a layer of bluish tinge below. The milk was pleasant in flavor and odor, and very superior in these respects to that of many animals, such as goats or camels, and quality equal to that of cows. Nor did the milk emit any rank odor on heating.

When 10 grams were evaporated to dryness, the last portions of water were hard to remove, as the residue fairly covered with oil. Only by long continued application of heat, and in analysis III, over sulphuric acid in vacuo, could a constant weight be obtained. I would have used sand in the drying or Baumhauer's method of fat extraction, but for the small quantity of milk at my disposal, and from fear of loss of fat in the latter case.

The fat in III was determined by extracting the dried residue, and also with 20 c.c. of milk, by adding alkali and shaking with ether, removing and evaporating the ether, and weighing the fat.

As is shown in the table, the sp. gr. is very low, though the solids, and solids not fat, are great. The ash, casein and sugar are in about the usual proportion. The weight of casein is, it is true, but half that of the sugar. The milk indeed shows an unusually great preponderance of the non-nitrogenized elements, and this seems to correspond with the wants of the animal, since the fatty tissues are

greatly developed in elephants. According to Mr. Cross, who has had large experience with these animals, they are fatter in the wild state than in bondage. These specimens must appear as exceptional; they may be considered by some as "strippings," but as against such a view we have the recurrence in each sample of the same characteristics in the milk, and a near correspondence in the composition. As may be seen from the subjoined analyses given by v. Gomp-Besauer, the milk belongs to the class of which human and mare's milk are members, especially as regards the proportion of the non-nitrogenized to the nitrogenized elements. It may be remarked that though approaching the composition of cream, it still differs enough to require it to be considered milk.

Perhaps if a larger quantity of the milk could be collected, it would assume a more watery character, and approximate more nearly to other milk in that respect. However this may be, the quality of the fat deserves some attention.

The fat has a light yellow color, resembling olive oil, is very pleasant in odor and taste, is liquid at common temperatures, but solidifies at 18° C. = 64° F.

The cow must yield a considerable quantity of milk since the growth of the calf has been constant, and at the time these samples were milked, the mother gave as freely to her babe as she ever had since its birth. The calf having gained 7–800 lbs. on a milk diet in one year, it is presumable that it had no lack of nourishment.

In size the "baby" compared equally with other elephants in the same menagerie, who were known to be four and five years old.

From whatever standpoint, therefore, we view the lacteal product of these four-footed giants, we are fully warranted in ascribing to it not only extreme richness, but also great delicacy of flavor.

	Women.	Cows.	Goats.	Ewes.	Asses.	Mares.	Buffalo Cows.	Camels.	Sows.	Hippopotamus.	Elephants.
Water	86.271	84.28	86.85	83.30	89.01	90.45	80.640	86.34	81.80	90.43	66.697
Solids	13.729	15.72	13.52	16.60	10.99	9.55	19.360	13.66	18.20	9.57	33.303
Fat	5.370	6.47	4.34	6.05	1.85	1.31	8.450	2.90	6.00	4.51	22.070
Casein	2.950	3.57	2.53	5.73	3.57	2.53	4.247	3.67	5.30	4.40	3.212
Albumen		0.78	1.26							Milk Sugar included.	
Milk Sugar	5.136	4.34	3.78	3.96	5.05	5.42	4.518	5.78	6.07		7.392
Ash	0.223	0.63	0.65	0.68		0.29	0.845	0.66	0.83	0.11	0.629
Nitrogenized	2.950	4.35	3.79	5.73	3.57	2.53	4.247	3.67	5.30		3.212
Non-Nitrog'niz'd	10.506	10.81	8.12	10.01	6.90	6.73	12.968	8.68	12.07		29.462