cells and many granular casts, and urines containing an admixture of vaginal secretions. It may be added that none of these substances clear upon the application of heat as herein outlined. In biliary urines it was commonly seen that the upper portion of the column cleared when heat was applied, but the color resulting from the bile pigments remained unchanged. Microscopic study assists in distinguishing, beyond any possibility of a doubt, substances likely to be mistaken for amorphous urates. However, we are forced to resort to chemical measures in differentiating between amorphous urates and amorphous phosphates. Albumoses coagulate at about the temperature at which urates are returned into solution, but it is improbable that it would be capable of conflicting in any way with this reaction.

ON THE TREATMENT OF OBESITY.*

HEINRICH STERN, PH.D., M.D.

Professor of Internal Medicine, New York School of Clinical Medicine; Formerly Professor of the Diseases of Metabolism, St. Louis College of Physicians and Surgeons; Consulting Physician, New York Red Cross Hospital; Visiting Physician St. Elizabeth's and Metropolitan Hospitals.
NEW YORK CITY.

A rational therapy of polysarcia is only possible on the basis of a more precise differentiation between the principal types or degrees of this metabolic anomaly.

A number of authors have attempted to distinguish between the forms of corpulency. The classification of Immermann¹ into the plethoric and the anemic types, partly on account of a certain clinical justification, but mostly on account of its adoption by Oertel,² is the best known and enjoys universal acceptance by later writers on the subject. This differentiation, however, is one of degree more than of character, and, in advanced cases of obesity when pronounced degenerative changes have taken place, the one type can not be distinguished from the other.

Guided by the external appearance, Immermann assigns the cases to one of the two categories: 1, to the plethoric group he refers the instances occurring in the robust; 2, to the anemic class, those obese individuals who display a weakened muscular system. In the following I have delineated some characteristics of the two forms—in their extremes:

	PLETHORIC TYPE.	ANEMIC TYPE.
Occurrence:	more frequent in males;	more frequent in women.
Corpulency due to:	hyperingestion of foods and liquids;	deficient oxidation.
Appetite:	excessive;	impaired.
Appearance:	ruddy;	pale.
Endurance:	little if at all reduced;	excessively diminished.
Body temperature:	normal;	frequently subnormal.
Integument:	smooth, greasy;	rugose.
Muscular system and adipose:	firm;	flaccid.
Heart:	vigorous (bradycardia in advanced stage weak and arrhythmic);	feeble.
Arterial tension:	increased;	lowered.
Blood (hemoglobin and corpuscles):	abundant;	deficient.
Edema of lower extremities:	infrequent;	frequent.
Urine:	abundant;	diminished.
Accompanying conditions:	lithemia, oxaluria;	dyspnea.
Tendency to:	arterio-sclerosis;	hypostatic congestion of lungs.

It is obvious that in their extremes these two clinical pictures exist more infrequently than in their intermediate degrees—conditions of corpulency partly resembling the one, partly the other type. The vast majority of instances of lipomatosis belong neither absolutely to the

"plethoric" nor to the "anemic" form, and therefore do not permit of a definite classification. Inasmuch as a differentiation is often impossible, the value of the Immermann-Oertel classification, for practical and especially therapeutic purposes, is quite limited and besides often problematic.

CORPOREAL SPECIFIC GRAVITY AND POLYSARCIA.

Sometime ago I attempted to demonstrate that the volume weight of the animal body discloses, with a high degree of certainty, the physical condition of its structures.³

Fat is the only important tissue constituent which possesses a lesser degree of density than water. Adiposis causes a reduction of the specific gravity of the organism, and that, in the same ratio in which the increase of fatty material has taken place. Polysarcia, however, in spite of its name—much flesh—is neither always dependent upon an increase of the corporeal solids nor upon the relation of protoplasm to fat; it is frequently but the consequence or the manifestation of tissue hydration, and of the increased contents of water in the organism. In other words, rotundity of the body may be due to an absolute increase of protoplasm, to one of protoplasm and fat, to an absolute increase of fat alone, or to an increase of the liquid tissue constituents either *per se* or together with fatty deposits.

The specific gravity of an individual in a given case of polysarcia, is, therefore, dependent upon the following possible factors: 1, protoplasm +, total inorganic solids +; 2, protoplasm +, fat +; 3, protoplasm stationary, fat +; 4, protoplasm —, fat +; 5, protoplasm —, fat +, H₂O +.

It is not my intention to dwell upon the polysarcia-corporeal density relation at greater length. Some of my pertaining investigations will be published in the course of the year. Those who are interested in the subject, I refer to my article in the *Medical Record* of February 9, 1901. The few facts, however, which I have related in the foregoing make it evident that the Immermann-Oertel differentiation, as a basis for rational treatment, is without any doubt inadequate and superficial.

Classifications according to the increase in absolute weight, into very pronounced, moderate and slight corpulency, may serve a purpose, if denoting the obesity degree of a certain type. In differentiating between certain obesity forms, the degree classifications are illogical, and, to say the least, useless for therapeutic intents.

The determination of the volume weight of an individual would be but rarely practiced and the corporeal specific gravity would hardly ever become a factor in physical diagnosis if, to ascertain these, we were compelled to employ any volumetric device or tedious mathematical calculations. However, the density of the blood may well serve as an indicator of corporeal density. A series of observations on men, conducted by the writer, has pointed out that the volume weight of an individual in the physiologic as well as in the pathologic state, is reflected in the specific gravity of his blood. That is, that a high blood density corresponds with a high body density, and a non-transitory hydremic condition with a low corporeal specific gravity. Congruous density degrees of blood and body, it is true, were rarely found. Again, the deviation between the two specific gravities in every instance was so slight that it seems rather due to shortcomings in the methods utilized in ascertaining the densities of both blood and body, than to an abnormal

* Read at the Fifty-second Annual Meeting of the American Medical Association, in the Section on Materia Medica, Pharmacy and Therapeutics, and approved for publication by the Executive Committee: Drs. Thomas Hunt Stucky, Leon L. Solomon and N. S. Davis, Jr.

distribution of the fluid contents in the organism. The difference between the two densities in these observations amounted, on the average, to about six degrees in favor of the corporeal specific gravity. This figure six may be employed as a standard or coefficient, for the estimation of the volume weight of a healthy adult male from his blood density, by adding it to the latter.

Since reading my first article on the subject—October, 1900—I have had occasion to extend my observations upon the relation of total volume weight to blood density in the female organism. The data obtained are almost analogous to those I had found in males, and the same coefficient, six, is, for all practical purposes, sufficiently accurate for the calculation of the approximate volume weight from the blood density, in the normal female individual.

Again, fluctuations in the physical condition of the body are distinctly reflected in the physical condition of the blood. In the abnormal state, the permanent higher and lower degrees of blood concentration also correspond with a higher or lower specific gravity of the total organism. The various forms of polysarcia are no exception to this rule. The coefficient plus six, as I have convinced myself in a number of observations, may be also utilized in computing from the blood density the volume weight of the obese male or female.

I am in the habit of determining the type of obesity on the basis of the specific gravity of the individual. Accordingly I differentiate between:

1. Polysarcia concurring with a relatively high degree of corporeal specific gravity—hyperplasmic obesity or lipomatous hyperplasma.
2. Polysarcia associated with a normal or slightly diminished degree of body density—metabolic or common obesity.
3. Polysarcia associated with a lesser volume weight of the organism—hydroplasmic obesity, or lipomatous hydroplasma.

HYPERPLASMIC OBESITY OR LIPOMATOUS HYPERPLASMA.

Hyperplasmic obesity is the rarest type, forming, according to my notes, about 6 per cent. of all cases of corpulency. It occurs principally in male subjects, most often between the ages of 27 and 38. I have seen two or three instances of it in women. This form of polysarcia is the only one true to this name, inasmuch as the stoutness is caused by the augmentation of the body protoplasm alone. Corpulency of this type is never very pronounced; the increase in body weight but rarely exceeds 15 kilograms. The average surplus in absolute weight may be put down to 7 kilograms, about 15 pounds.

The polysarcia of this class is characterized by the following: Extreme firmness and strength of the muscles; dry skin; increased cardiac activity; high arterial tension, usually above 160 mg. Hg, by the sphygmomanometer, and high blood density. The latter amounts at least to 1064, but frequently to 1068 and above in the male, and to 1062 and 1066 and more in the female organism.*

The volume weight of the individual attains a considerable degree, which may be ascertained by adding the coefficient to the degree of blood density. It will be found that the corporeal specific gravity in hyperplasmic

obesity is from 5 to 9 points higher than in the normal state.

This form of corpulency, not disfiguring or in itself weakening the system to any extent, demands our special attention on account of its complications. Among the latter, incipient nephritis and metabolic anomalies, as xanthemia, arthritis urtica, oxaluria are common. The one concomitant phenomenon invariably present, however, is that chronic condition which v. Basch⁶ has designated as "latent arterio-sclerosis." The continued high blood pressure points to the existence of this condition. No other symptoms are indicative of latent arterio-sclerosis, for the moment such occur the affection is not latent any longer. The affection is not even in its incipency, as there is neither polyuria nor albuminuria, whose presence one might infer to arterio-capillary fibrosis.

At the period when conspicuous anatomic changes symptomatic of arterio-sclerosis appear, which invariably are produced if proper treatment is not early instituted, the polysarcia has been transformed from the hyperplasmic to one of the metabolic types.

Again, as hyperplasmic obesity is always accompanied by latent arterio-sclerosis, we may well assume that this is not a mere complication of the former, but a condition arising from the same factor, and at the same moment as the polysarcia itself. Viewed from this point, hyperplasmic obesity is but a symptom of a certain systemic anomaly.

METABOLIC OR COMMON OBESITY.

Metabolic obesity is the most frequent type, forming, according to my statistics, about 68 per cent. of all instances of polysarcia. Its frequency is greater in males than in females, the ratio being about 5 to 2. It is an affection of middle life, but is not uncommon in well-fed children. In women I have never seen a case above the age of 65, a period of life when it is rare in males.

I distinguish two varieties of metabolic obesity, viz., one kind where an increase of body protoplasm concurs with an enlarged deposition of fat, the other in which adiposis is increased without synchronous augmentation of albuminous tissue constituents.

Its characteristics in general answer to those of the plethoric form of the older writers, heretofore described. There is no or almost no discrepancy between the corporeal density in this type of polysarcia and that of the normal individual. This is especially the case when both body protoplasm and fat are increased in a similar ratio in which they occur in the normal organism. The greater the increase of fat as compared with that of albumin, the lower will be the corporeal specific gravity. The least degree of body density in this form of obesity is found in those instances where the tissue albumin is neither augmented nor reduced, and where fatty matters alone have accumulated. The volume weight in metabolic obesity varies between 1062 and 1067 in males, and between 1059 and 1066 in females. These figures are arrived at by the addition of the coefficient six to the respective blood density.

While in this, the common type of polysarcia, the surplus in absolute weight is often considerable, it does not exceed 20 or 30 kilograms in the majority of instances. However, in the United States cases of 50 and 75 kilograms surplus become more frequent from year to year, especially in the large cities, where great distances have called forth ever ready transportation facilities, which in turn have given rise to abnormal body inactivity and in many instances to corpulency.

* A condition analogous to hyperplasmic obesity is occasionally observed in animals fattened by a special method. Müntz (Comptes Rend., Tome 112, p. 298, v. Limbeck) found a blood density of 1058 in fattened and one of 1038 in normal sheep. The dry residue of the blood of the fattened animals amounted to 20.33, that of the common sheep to 13.60 per cent.

In the same proportion in which the number of those who take their daily "constitutional" declines, the great family of the bodily unsound and the obese grows.

The chronic disorders concurrent with hyperplasmic obesity also accompany this type of polysarcia. Their presence is independent of the degree of corpulency as well as in a certain measure of its duration. However, the concurrent affections are usually more developed than in the hyperplasmic condition—latent arterio-sclerosis has yielded to incipient or pronounced arterio-capillary fibrosis; the heart in consequence is hypertrophic. The most clearly defined complications in metabolic obesity are due, to a certain extent, to the more advanced age of the patient, which, on the average, is about 10 years above that of the individual possessed of the hyperplasmic form of polysarcia. Again, the occurrence of accompanying conditions, which are almost as frequent as the main affection itself, forces us to consider metabolic obesity like the hyperplasmic type, as a mere phase or phenomenon in a general systemic deterioration.

HYDROPLASMIC OBESITY OR LIPOMATOUS HYDROPLASMA.

Hydroplasmic obesity is found in about 25 per cent. of all cases of polysarcia. It is most common in women and may occasionally appear at puberty. Normally, however, it occurs between the 35th and 48th year.

Among the principal characteristics of this type of obesity may be enumerated the following: Pallor eximius; flaccid adynamic muscles; wrinkled skin; flabby abdomen, inclining frequently over the genitals; low arterial tension; weak heart; low blood density; varicosis; edema, and scanty urination. The specific gravity of the organism is considerably lowered, which is evinced by the low blood density. Obese individuals whose volume weights are below 1060 in males and 1056 in women, that is, whose blood density is less than 1054 and 1050 respectively, belong to the hydroplasmic group.

We encounter here two varieties, namely, one in which the protoplasm is diminished and the fat alone increased, the other in which the loss of body albumin coincides with an increase in fatty substances and water. It is evident that the corporeal density of the obese in whom loss of albumin and increase in fat and water occurs, is somewhat higher than that of the individual of similar absolute weight in whom equal loss of tissue albumin but increase of fatty material alone had taken place.† In both eventualities, however, the volume weight would be subnormal, as the density of water is 1 and that of human fat 0.932.

The absolute weight in hydroplasmic obesity, although the patients appear exceedingly corpulent, as a general rule does not reach as high a point as in the metabolic type. An average surplus of kilograms as in the other types of polysarcia, on account of the great divergences in absolute weight in the individual cases, can not be consistently accepted.

Lipomatous hydroplasma, even in a greater measure than the other forms of corpulency, is not an independent affection, but a most conspicuous symptom of a general degenerative process. The latter is probably the same which stands at the foundation of the other classes of polysarcia. Hence, hydroplasmic obesity may be the direct and early result of a systemic degeneration, or it may be consequential to one of the other types of corpulency.

† It is doubtful whether an increase of fat material without one of water can ensue at all: the one variety is characterized by excess of water in the tissues, in the other variety the amount of water is also somewhat increased.

INDICATIONS FOR THE TREATMENT OF OBESITY.

All that has been heretofore stated tends to evince that obesity, irrespective of the type in which it appears, is not an affection per se, but a link only in a chain of symptoms pathognomonic of certain nutritional disorders, which in turn give rise to a slower or more rapid systemic deterioration. In so far as the amelioration of a prominent symptom is followed by an improvement in the general condition, the treatment of polysarcia, apart from some exceptions, is therefore always indicated.

As long as corpulency does not interfere with vital functions, a proper treatment is hardly ever instituted. It does not enter the mind of the otherwise still comparatively healthy obese to undergo unusual exertion or self-deprivation for the mere purpose of reducing the body weight. He does not care whether he weighs a few kilograms more, or less. Nowadays uncomplicated polysarcia, that is, where the concurrent phenomena are still obliterated and remain unrecognized, if treated at all is done for cosmetic reasons only. The vast majority of the corpulent do not consult a physician before the accompanying disorders and conditions compel them to do so. At this stage to be sure, the treatment, be it ever so well advised, can not accomplish what it would have afforded if instituted earlier in the course of the affection.

Cases of *hyperplasmic* obesity never attain the enormous increase in absolute weight which may occur in the other types. The over weight, not exceeding 15 kilograms in most instances, in itself does not call for any treatment. A surplus of from 10 to 15 kilograms in the adult well-developed individual may even be considered as within the physiologic limits, and, as a matter of fact, such individuals are accepted by the life insurance examiner. However, in hyperplasmic obesity we meet not only with an increase in absolute weight, but also with one in the specific weight of the organism. The concurrence of these factors in every instance is an indication of a systemic anomaly demanding treatment.

Hydroplasmic obesity, always denoting the presence of grave disturbances in the organism, irrespective of the amount of overweight in a given case, is *a priori* an indication for the institution of proper treatment.

In *metabolic* obesity, the common form, where there is no or practically no alteration in the corporeal density, treatment may not be absolutely indicated if the surplus weight is yet within physiologic range. A body weight 10 or 15 per cent. above the average may still be considered normal. In those cases, however, where the over weight exceeds 15 per cent., no matter how well the individual pretends to feel otherwise, treatment is urgent and should be insisted upon. Therapeutic measures should be taken before the concurrent affections have become too prominent a factor.

Besides old age and diabetes mellitus, there are few if any contraindications to the institution of de-adiposation.

At this point it is seasonable to mention something relating to the mean height and weight of both sexes in the different ages of life.

Guételet's figures, which are copied in all pertaining works, are based upon investigations and statistics concerning the French race and are certainly misleading if applied to the American people. Children and adults of both sexes on the average are taller and heavier in this country than are individuals of the same age in France. I have computed the appended table as follows: Height to 14th year inclusive, according to Monti⁶: weight to the 18th year inclusive, according to Cam-

erer.⁷ The populations of Australia and Southern Germany present almost the identical physical characteristics. Those of the young Americans, if at all, differ but slightly. The remaining figures have been obtained partly by investigation and partly by comparisons and calculations.

AUTHOR'S TABLE DENOTING MEAN HEIGHT AND WEIGHT OF BOTH SEXES IN THE DIFFERENT AGES OF LIFE IN U. S.

Age.	Men.				Women.			
	Body, inches.	Height, cm.	Body, pounds.	Weight, kilo.	Body, inches.	Height, cm.	Body, pounds.	Weight, kilo.
1.	28.74	73	21.78	9.9	28.50	72.4	20.24	9.2
2.	32.67	83	28.16	12.8	32.44	82.4	24.60	11.2
3.	35.82	91	32.70	14.9	35.59	90.4	29.04	13.2
4.	38.18	97	36.68	16.9	37.95	96.4	33.	15.
5.	40.55	103	39.60	18.0	40.31	102.4	35.20	16.
6.	42.91	109	43.34	19.7	42.68	108.4	38.50	17.5
7.	45.27	115	47.08	21.4	45.04	114.4	41.58	18.9
8.	47.63	121	51.7	23.5	47.40	120.4	40.92	18.6
9.	50.	127	55.60	25.3	49.76	126.4	49.06	22.3
10.	52.36	133	60.94	27.7	52.13	132.4	54.56	24.8
11.	54.33	138	66.40	30.2	54.09	137.4	58.52	26.6
12.	56.30	143	72.60	33.	56.06	142.4	67.98	30.9
13.	58.27	148	78.10	35.5	58.03	147.4	77.44	35.2
14.	59.84	152	84.40	38.4	59.60	151.4	87.34	39.7
15.	61.42	156	105.80	48.1	59.84	152.	97.02	44.1
16.	63.39	161	120.10	54.6	60.	152.4	97.46	44.3
17.	65.35	166	132.80	60.4	60.39	153.4		
18.	66.93	170	136.40	62.	61.18	155.4		
19.	67.32	171	138.60	63.	61.84	157.	118.80	54.
20.	67.72	172	144.10	65.5	62.36	158.4	122.10	55.5
25.	68.90	175	151.80	69.	63.15	160.4	124.30	56.5
30.	69.29	176	154.	70.	63.78	162.	124.30	56.5
35.	69.90	175	157.30	71.5	63.54	161.4	127.60	58.
40.	68.90	175	166.60	73.	63.39	161.	133.10	60.5
45.	68.11	173	161.70	73.5	62.99	160.	132.	60.
50.	67.72	172	156.20	71.	61.81	157.	128.70	58.5
55.	67.32	171	151.80	69.	61.42	156.	126.50	57.5
60.	66.93	170	149.60	68.	61.02	155.	126.50	57.5
70.	66.14	168	145.20	66.	60.23	153.	117.70	53.5

GENERAL CONSIDERATIONS CONCERNING THE TREATMENT OF POLYSARCIA.

Lipomatosis universalis may have been caused directly either by excessive ingestion of nutriment or by its diminished oxidation in the organism, or by both eventualities together.

The caloric demand for the maintenance of the metabolic equilibrium is dependent upon the amount of work performed by the organism. The more the individual exerts himself, the higher must be the caloric value of his nourishment and vice versa; the greater the bodily inactivity, the less energy is expended, and the smaller need be the fuel supply of the organism.

A normal man utilizes on the average, for each kilogram of body weight per day when at absolute rest, 30 calories, of which 4.1 calories should be yielded by albumin. For each kilogram of body weight when leisurely occupied, 35 calories, of which 5 should be yielded by albumin. For each kilogram of body weight when moderately active, 40 calories, of which 6.1 should be yielded by albumin. For each kilogram of body weight per day when laboring strenuously, 45 calories, of which 7.2 should be yielded by albumin.

A man of 35, weighing 71.5 kilograms, for the maintenance of his metabolic equilibrium, should, therefore, consume daily an amount of foodstuffs yielding as follows: 2145 calories, of which 293.15 should be albumin calories, when at absolute rest; 2502.5 calories, of which 357.5 should be albumin calories, when leisurely occupied; 2860 calories, of which 436.15 should be albumin calories, when moderately active, and 3217.5 calories, of which 514.8 should be albumin calories, when laboring strenuously.

Roughly speaking, about the sixth part of the total

calories needed by the animal organism should be derived from ingested albumins.

The same individual having changed his boarding house, continues to take similar nourishment in quantity and quality as before. However, instead of finding boiled potatoes on the table every evening, which he was accustomed to eat by simply adding some salt, he now is served three times a week with fried potatoes. The change, trifling in itself, is hardly noticed by him, but alas, after a few months his waistcoat becomes too narrow for him and he opens at first one, and as time progresses two and more buttons during the meals. Why does he do that? The fried potatoes contain at least 20 grams of butter; one gram of butter yields 9.3 calories. The 20 grams represent, therefore, a caloric value of 186. As he is now eating this dish three times a week, the surplus in calories amounts to $186 \times 3 \times 26$, or 14,508 calories in six months. Almost the total surplus of 1560 grams has been deposited in the organism in the form of fat, and, as adipose tissue contains about 40 per cent. of water, the total increase in body weight amounts to 2184 grams, about 4.5 pounds. In a year the surplus body weight would be 9 pounds, and if the individual chooses to partake of fried potatoes every day for a year his body weight would be increased from 71.5 kilograms, or 157 pounds, to 81.77 kilograms, or 179.5 pounds, during that period.

Assuming, on the other hand, that this same person, who was always moderately active, retires to a life of leisure, but continues to ingest daily an amount of foodstuffs valued at 2860 calories, he introduces about 350 more calories than can normally be burned up in his body. If the non-oxidizable surplus amounts to even but 250 calories, 26.4 grams of fat are daily deposited in the organism. In a year the increase in fat amounts to 9636 grams and that of adipose tissue to about 13,488 grams, or 29.6 pounds.

Before instituting treatment for polysarcia the following factors should be therefore ascertained: 1. Age and absolute weight of patient. 2. Approximate extent of surplus adipose deposition. 3. Degree of body activity other than that essential for the conduct of vital functions. 4. Caloric value of nutriment habitually ingested.

The first step in the actual treatment should be adjustment of the ingesta in accordance with the degree of muscular activity, or regulation of the latter with regard to the amount of calories yielded by the foodstuffs habitually consumed.

When we bring home to our mind the fact that in the obese the surplus weight in the vast majority of instances is due to fat alone, or to fat and water, we can readily understand that it is no easy task to definitely determine from the number of kilograms of body weight the nutrient calories actually needed by the organism. Intracellular fat and water usually neither participate in the general systemic metabolism, nor contribute towards the performance of muscular work. On the contrary, they are an absolute ballast to the individual, predisposing him to various diseases, especially epidemic ones, and impeding more or less the vital as well as the muscular activity.

In calculating the necessary calories, at least in an approximate manner, it is best to ascertain the height of the patient, and, with the assistance of the appended table, the corresponding weight in kilograms. In most cases of metabolic obesity it suffices to multiply the number of kilograms thus obtained by 25, to learn the mini-

num amount of calories daily needed. For instance, take the case of a male, aged 35, having an absolute weight of 95 kilograms, and height of 172 cm. The normal weight corresponding to 172 cm. height is 65.5 kilograms, therefore $65.5 \times 25 = 1637.5$, is the minimum amount of calories necessary to prevent the consumption of body albumin in this individual.

In hydroplasmic obesity, on the other hand, when starting with the treatment, the amount of food prescribed, whether its caloric value was compiled in the aforementioned or any other manner, always remains to a great extent a matter of conjecture. This type of polysarcia, it being virtually a condition of hypotrophy, frequently demands a diet of increased nutritive—not caloric—value. Diminution of absolute weight in hydroplasmic corpulency without concurrent increase in body density as evinced by the specific gravity of the blood, denotes deficient alimentation.

Patients under treatment for obesity should have their food carefully weighed and should be seen every third or fourth day, during the first two weeks, ten at least once a week for one or two months, and after that, fortnightly for a period of from three months to a year. On each occasion the patient should be weighed on an accurate scale, and, in the hyperplasmic and hydroplasmic types, the blood density should be ascertained at least once every two weeks, while in the metabolic variety it is sufficient to take it once a month.

Equally important as the decline in absolute body weight is the degree of blood and body density during the period of treatment. The blood density serves as the means of control, whether the measures which have been taken to reduce obesity are proper or not. For instance, a woman 157 cm. high, weighing 95 kilograms, and possessing a blood density of 1050, undergoes treatment. When seen at the end of a month she complains of extreme weakness, of emaciation and pains in the back and limbs, and of palpitation of the heart on the smallest exertion. She has lost during this time 7 kilograms in body weight. An examination of the blood reveals a density of 1048, a decline of 2 degrees since starting treatment. The diminished specific gravity of the blood, congruous, as we have repeatedly seen, with a lesser volume weight, denotes that the woman was underfed. Her subjective symptoms were probably all produced by underfeeding.

We should endeavor to accomplish the following in the treatment of the different forms of polysarcia:

In hyperplasmic obesity, reduction of absolute as well as of volume weight; metabolic obesity, reduction of absolute weight and maintenance of volume weight; and in hydroplasmic obesity, reduction of absolute weight and increase of volume weight.

The well-known dietary systems of Harvey-Banting,⁸ Ebstein,⁹ Oertel,² (Schweninger) Kisch,¹⁰ and Hirschfeld¹¹ make no or but indefinite reference to the volume weight of the organism. There is no doubt but that all these regimens serve an admirable purpose in suitable cases. However, they are not applicable in all forms and degrees of obesity. Kisch and Oertel especially have recognized this when they prescribed different diet lists for the plethoric and the anemic types of the affection.

These dietary regulations possess the drawback in common that the patient is underfed, and that the calories elaborated from the prescribed nutriment do not suffice to prevent gradual consumption of the body protoplasm. I had occasion to observe in a number of instances that after ten or twelve days' employment of certain

of these dietary systems, the amount of nitrogen egested surpassed that of nitrogen ingested. The large quantities of fat recommended in some of these regimens, although yielding large amounts of calories, may still not be sufficient to avert the loss of body protoplasm after the first or second week. The results of overfeeding can not be obliterated by systematic underfeeding. I am of the opinion that, apart from some exceptional cases, the employment of a diet valued at less than 25 calories per kilogram normal body weight, means, to say the least, unnecessary deprivation to a patient following his vocation. Cases treated according to Weir-Mitchell's or other methods of rest cure, where absolute inactivity is demanded, will undoubtedly get along with a smaller number of calories for a certain period. However, we have to deal, in the vast majority of cases, with people who are not only able but also should be up and about, and it must be our foremost aim to preserve the strength and resistance of these patients. A rational treatment of obesity can only be instituted on the basis of increased bodily exertion and oxidation and not on that of underfeeding.

There is a diversity of opinion concerning the amount of water necessary in the treatment of the obese. In the chapter on the "special management of the different types of polysarcia" the amounts of water per kilogram per day which I found best suited to keep up cellular activity to its fullest extent, are recommended for each specific form of the affection.

No mention is made in these lines of alcoholic and malted beverages. The latter are positively contraindicated in the treatment of obesity, and the former, which some modern authors permit in moderate amounts, although they possess high caloric values, I find, to say the least, entirely superfluous in the therapy of this as well as of all other pathologic states.

All measures which enhance the oxidizing qualities of the organism prevent further deposits of adipose tissue and contribute toward lipolysis. As long as the corpulent is properly fed, as long as he retains a certain amount of strength, such measures may be employed. Hydrotherapy, balneotherapy, mechanotherapy, gymnastics, etc., combined or alone, in any of their manifold variations, they all serve but one purpose—to increase the process of oxidation and the subsequent fat combustion. The selection of a mode of physical treatment when starting may be entirely left to the discretion of the patient. By permitting this the medical adviser gains the latter's good will, does not overburden him, and has no difficulty in adjusting the indicated measures later on. It requires great self-command on the part of many obese to continue and increase a certain method of exercise. This is especially the case when visible results do not immediately follow the first attempt.

Muscular exercise, whether passive, active, concentric or eccentric, is always essential in the treatment of lipomatosis. Even in cases of advanced hydroplasma, when the patient is compelled to stay in bed, massage and certain passive movements should be insisted upon. Active muscular exercise, as walking, climbing hills, rowing, boxing, bicycle riding, etc., are the most potent factors in increasing tissue oxidation. In every individual case the ability for exercise should be carefully ascertained. The patient must not be overtaxed in this respect, as this may call forth results which are analogous to underfeeding. As stated before, the patient may in the beginning select the mode of exercise which he intends to execute; his choice generally is walking on the level

ground. In cases in which cardiac asthenia is very pronounced, the form and amount of exercise to be taken is to be minutely described by the physician. In other cases, especially the metabolic variety, detailed directions are but rarely required. The amount of meters which the patient has to walk is to be increased from time to time. The robust may extend his promenade 1000 meters at a time; in the weak and hydroplasmic a gradual increase, say 100 or 200 meters at a time, will give the best results. Climbing, which may be indicated from the start for persons affected with the metabolic variety of polysarcia, should never be recommended as the initial form of exercise when the systemic deterioration has far progressed. Such cases should be handled with the greatest care—at first walks on the level and later climbing, but this in moderation only. It has been estimated that tissue combustion when climbing for the distance of one meter is ten times greater than when marching the same distance on level ground. In all instances of hyperplasmic and in many instances of metabolic lipomatosis, mountain climbing is imperative for curative purposes. In my experience, descending mountains or stairways has proven a valuable adjuvant in the treatment of polysarcia, principally in such instances where the over weight was considerable. It is true that the act of descending itself does not greatly intensify oxidation; this exercise, however, affords a most convenient means of stimulating the abdominal muscles to increased activity. The technique of descending exercise which I pursue is very simple. The patient is carried by the elevator to the fifteenth or twentieth story of an office building or other high structure. For the first week he is ordered to slowly descend the stairs, without holding to the banister, 10, 15 or 20 stories, as the case may be, from one to four times daily. During the second and third weeks this exercise is somewhat modified, the patient descends from step to step in a jumping manner, which produces a jolting of all the muscles of the abdomen. Later on the same exercise is continued, but the individual is ordered to perform it at his utmost speed. Athletic practices, so long as they do not overtax the strength or affect the heart and nervous system, are of a certain value in the treatment of all types of polysarcia. Of course proper gymnastic exercise has to be selected for each individual case. I prefer a course of calisthenics, especially such as are arranged for strengthening and developing the trunk, for they can not possibly do any harm and most of the movements may be readily executed. One of the most expedient exercises for the furtherance of systemic combustion is gymnastics of the lungs. The patient should be first taught to breathe properly. The inspiration should gradually become deeper and deeper until finally almost the whole lungs participate in the process. It is best to perform these chest-expanding exercises in the evening before retiring. I am in the habit of combining the lung gymnastics with air baths, that is, have the patient exercise while nude, and perform various muscular movements, the detailed descriptions of which I have to forego at this moment.

Besides diet and exercise a number of medicinal agents have been employed in the reduction of obesity. The following drugs and chemicals have been reputed to be anti-fat remedies: Iodin, and its preparations; phytolacca decandra; thyroid extract; vegetable acids; vinegar; lemon juice; alkaline, acidulated and sulphurous mineral waters; alkalies, as liquor potassæ; fucus vesiculosus; sodium chlorid; purgatives, and a legion more. Most of these have of late come into discredit, be-

it on account of their inefficiency and uncertainty of action, or on account of certain obnoxious results following their administration. It is my opinion, however, that most of these drugs, if given in sufficient amounts, bring about reduction of body weight. They act in large doses like certain poisons, the introduction of which is followed by emaciation, loss of strength, irritability, anorexia, insomnia and often chronic diarrhea. The majority of these are useless in small doses, and in large ones do not only produce dehydration and de-adiposition, but invariably also a melting down of body albumin. Their use, with the exception of a few, should, therefore, be unconditionally condemned, especially in instances of metabolic or hydroplasmic obesity. Some mineral waters, thyroid preparations whose action is modified, and fucus vesiculosus form the exception to this rule.

It is uncertain, apart from their aperient and laxative action, what the *modus operandi* of mineral waters, as those of Marienbad, Carlsbad, Kissingen, Saratoga, and the Hungarian waters, like Apenta, really is. Their influence in the rarest instances is a chemical one. The blood is not altered in its composition, at least not for any length of time after these waters are taken. Metabolism, however, increases under their continued administration. It appears as if the salt solutions exhibit physical functions by increasing the osmotic pressure in the organism. The acceleration of metabolic processes may be the direct consequence of the latter.

Thyroid therapy a few years ago seemed to be the panacea in the amelioration of obesity. But, alas, the indiscriminate use of the glandular substance by every one who wished to effect rapid reduction of his corpulency, was frequently followed by disappointment and by bad after-effects. In the wake of self-treatment by thyroid extract I have seen glycosuria in six or seven instances. The origin of at least two chronic conditions of glycosuria which came under my observation could be traced to thyroidism. Cases of digestive disturbances, extreme nervousness, jactitation and cardiac weakness were not infrequently met with after ingestion of thyroid substance. Most of these untoward symptoms noted after the use of thyroid occurred in persons who relied upon their own mode of administration.

On account of its uncertainty of action and occasional pernicious effects, the profession has abandoned thyroid therapy to a great measure. However, this means throwing away the good with the bad. Thyroid extract is by no means a necessity in the treatment of polysarcia, but it is a valuable adjuvant if used with precaution. Especially is this the case where the treatment is started and when some immediate results are to be accomplished. The idea of having lost a few pounds in weight during the first week, as a rule, tends to renew the patient's failing energy. Later on, when the obese is accustomed to his new mode of living, the thyroid preparation may be withdrawn. Unless the patient is under a regulated diet so that he is in perfect nitrogen balance, and his tissue oxidation is somewhat increased by suitable exercise, the drug should not be administered under any circumstances. Ewald¹² demands even an adequate surplus of ingested nitrogen in order that the thyroid preparation may accomplish the removal of adipose tissue without doing injury to the body protoplasm.

I have modified the action of the thyroid by the addition of arsenic and adonidin, thus:

R. Acid arsenious	gr. 1/60	001
Adonidin	gr. 1/12	005
Thyroid gland, dry powder.....	gr. 2	12

M. Ft. compressed tablet No. i.

Six years ago I first observed that arsenic exerts a specific influence upon the activity of thyroid. Patients who took an arsenical and thyroid preparation synchronously never complained of any deleterious effects, while those who were treated with thyroid alone occasionally exhibited such symptoms as I have mentioned. So pronounced was the modifying power of arsenic that in the course of time I never prescribed thyroid preparations without adding arsenic in some form. My observations have been confirmed by those of Bédart and Mabilie,¹³ who did not find palpitation, tremor, etc., following the administration of thyroid if Fowler's solution—2½ drops per kilogram—was given simultaneously. Adonidin is added to the combination to further strengthen the heart and enable the patient to continue the prescribed exercises.

Fucus vesiculosus (bladder wrack) I found an innocent and efficient fat absorbent to be used in conjunction with proper diet and exercise. I have devised a citric acid tincture of the drug which serves an excellent purpose in preventing the recurrence of a previous state of obesity. One of my patients, aged 35, an actress of national fame, in spite of a proper diet and a good deal of exercise, would have attained such an embonpoint that she could not have followed her calling were it not for the citric acid tincture of *fucus vesiculosus* which she has taken for four years. She is and has been in absolute nitrogen equilibrium, possesses great powers of resistance and carries her 85 kilograms with graceful ease.

SPECIAL MANAGEMENT OF THE DIFFERENT TYPES OF POLYSARCIA.

Hyperplasmic Obesity.—Objects to be attained: Reduction of absolute and volume weights; diminution of arterial tension, and increase of body oxidation.

Diet: There should be given for each kilogram of normal body weight during twenty-four hours of albumins 1.3 grams or 5.33 calories, carbohydrates 1.8 grams or 7.38 calories, and of hydrocarbons 1.3 grams or 12.09 calories, a total of 24.80 calories. The quantity of water should be 60 c.c. Thus for a hyperplasmic male, aged 35, absolute weight of 80 kilograms, height 172 cm. (normal weight corresponding to 172 cm., 65.5 kilograms) the calories required for the patient in twenty-four hours would be 1637.5, as follows:

Albumins, 85.15 grams, or 349 calories; carbohydrates, 117.9 grams, or 483 calories, and hydrocarbons, 85.15 grams, or 792 calories, in all 288.2 grams, or 1624 calories. The amount of water would be 3930 c.c. These 1600 calories and 4 liters of water should be divided up thus:

Meal hours.		Albumins, grams.	Carbohydrates, grams.	Hydrocarbons, grams.	Water, c.c.
Breakfast, 7 a. m.	2 cups of tea or coffee, 10 c.c. fresh milk in each cup—no sugar . . .	0.7	1.	0.7	520
	2 boiled eggs . . .	12.6		12.1	
10 a. m.	35 grams rye bread, 8 grams butter	2.7	14.9	6.8	
	2 glasses of water . . .				500
	500 c.c. clear soup . . .	5.		7.5	500
	100 grams boiled beef . . .	35.		25.	
	100 grams spinach . . .	3.5	4.5	0.5	
Lunch, 1 p. m.	50 grams Roman salad, 5 c.c. olive oil . . .	1.1	1.8	5	
	70 grams wheaten bread . . .	4.9	39.6	0.4	
	100 grams apples, fresh . . .	0.4	17.		
	Demitasse coffee, 2 glasses water . . .				600
4 p. m.	1 glass of water . . .				250
	250 c.c. bouillon with 1 egg . . .	8.8		9.7	250
	30 grams hand cheese . . .	10.9		1.7	
Supper, 7 p. m.	250 c.c. skimmed milk . . .	8.1	11.6	2.5	230
	30 grams wheaten bread, 5 grams butter . . .	2.1	17.	4.2	
Before retiring.	2 glasses of water . . .				500
	Total . . .	86	118.4	86.8	3870
	Calories . . .	352.6	485.4	807.2	

The nutriment should contain the same amount of albumins, carbohydrates and hydrocarbons for at least six months. If after six months the body weight has been diminished and the corporeal density has attained a normal degree, the caloric value of the diet may be increased from 15 to 40 per cent. However, for about one week in every month, for about one year thereafter, if need be forever, the original diet must be followed. In regard to the water, 60 c.c. in twenty-four hours, for each kilogram of body weight, should be taken till the volume weight has definitely declined to a normal degree.

Exercise.—The patient should walk two or three miles after breakfast, one mile after lunch, and three miles after supper every day. A bath at a temperature of 72 F. (22.2° C.) should be taken three times a week, preferably before retiring. This exercise is to be continued for one or two years, or a longer period.

Medicines.—From 3 to 5 of the compound thyroid tablets, as given above, should be prescribed for about ten days; thereafter 3 tablets a day for a week in each of the following five months are to be given.

Metabolic Obesity.—Objects to be attained: Reduction of absolute weight; maintenance or increase of corporeal density; diminution of arterial tension, and increase of bodily oxidation.

Diet.—For each kilogram of normal body weight for twenty-four hours there should be taken of albumins 2.6 grams or 10.66 calories; carbohydrates 1.6 grams or 6.56 calories; and of hydrocarbons 0.8 grams or 7.44 calories; making altogether 24.96 calories. The patient should drink in that time 45 c.c. of water. Therefore a male, aged 35, affected with metabolic obesity, whose absolute weight was 90 kilograms and height 172 cm. (normal weight corresponding to 172 cm., 65.5 kilograms), should have in twenty-four hours 1637.5 calories, as follows: Albumins, 170.3 grams, or 698 calories; carbohydrates, 104.8 grams, or 430 calories; hydrocarbons, 52.4 grams, or 487 calories; in all 327.5 grams, or 1615 calories. The amount of water to be 2947 c.c. These 1600 calories and 3 liters of water should be divided up thus:

Meal hours.		Albumins, grams.	Carbohydrates, grams.	Hydrocarbons, grams.	Water, c.c.
Breakfast, 7 a. m.	500 c.c. milk, heated to 100° F . . .	17	24.	18.3	440
	1 roll, 30 grams . . .	2.6	19.		
10 a. m.	250 c.c. buttermilk . . .	10.	9.	0.7	230
	500 c.c. clear soup . . .	5.		7.5	490
	300 grams roast beef, very lean . . .	100.		7.5	
Luncheon, 1 p. m.	250 grams asparagus, little vinegar	4.5	6.5	0.5	
	30 grams wheaten bread . . .	2.1	17.		
	Demitasse coffee, 2 glasses water . . .				600
4 p. m.	1 glass of water . . .				250
	250 c.c. bouillon with 1 egg . . .	8.8		9.7	250
	30 grams hand cheese . . .	10.9		1.7	
Supper, 7 p. m.	250 c.c. skimmed milk . . .	8.1	11.6	2.5	230
	30 grams wheaten bread, 5 grams butter . . .	2.1	17.	4.2	
Before retiring.	2 glasses of water . . .				500
	Total . . .	171.1	104.1	52.6	2970
	Calories . . .	701.5	426.8	489	

A nutriment of the same caloric value and possessing the various ingredients in similar proportion, I find best suited for both varieties of metabolic polysarcia. This dietary should be kept up as long as possible, in no instance for less than three months. The purpose of a regimen, like that of the whole treatment advocated, is rather to effect physiologic reduction of obesity than rapid cure of it. It is evident, therefore, that the stricter and longer the diet is adhered to, the better and more lasting will be the results obtained.

Water.—The variety of metabolic obesity characterized by normal volume weight, where we have an increase of protoplasm together with fat, demands each day about 45 c.c. of water per kilogram of normal body weight, and this for a protracted period. In the other variety, where the deposition of fat alone is enlarged, the amount of water should be reduced to 30 c.c. a day per kilogram of normal body weight between the third and fourth weeks, and to 20 c.c. per day for each kilogram normal weight after two months. Soups and milk have then to be abandoned, partially or altogether, and the amount of nutrient thus withheld should be replaced by eggs or meats. However, for one week in each month, 45 c.c. of water a day per kilogram of normal body weight should be taken. Scales and hydrometer, as pointed out before, are to be employed whenever possible. Loss in absolute and increase in specific weight, denotes the effect of diet in the latter variety of metabolic obesity. In some of these cases, it is true, partial withdrawal of water from the onset of treatment will give quicker results, but the tendency to arthritis urtica, etc., especially when under such a highly albuminous dietary regimen, must always be taken into due consideration.

Exercise.—There is no type of polysarcia in which exercise in its various modifications is so much indicated as in metabolic obesity. A diet valued at 25 calories a day per kilogram of normal body weight is just sufficient to prevent underfeeding. Without a proper amount of exercise, therefore, such a nutriment may avert further increase in body weight, but it does not call forth the desired decrease, at least not in instances of highly-developed obesity. The cases in which augmentation of fat is proportionate to that of protoplasm in the greater part, require similar exercise to those of hyperplasmic obesity. But we have seen that the degree of polysarcia of the latter type is rarely as high as that of the metabolic corpulency, and, in the degree in which the obesity is more pronounced, the amount of exercise must be increased.

Walking, climbing hills, rowing, bicycle riding, boxing, wrestling, etc., each and all may be advantageously utilized. When beginning treatment the mode and amount of exercise may be left to the inclination of the patient. Later on, however, the exact amount of exercise has to be adjusted to the needs of the organism from week to week. It is best to start with the amount of exercise recommended for the hyperplasmic type and to increase gradually so that the patient may lose from one to three pounds a week. In the ratio in which the absolute weight declines the amount of exercise must be increased or diminished. The nearer the body weight approaches the standard, the less exercise should be taken; yet daily walks of prescribed lengths should continue to be taken even after the individual has attained a normal weight.

There are always cases of this class which, to all appearances, do not yield, where exercise and diet in the beginning of treatment do not seem to exert the slightest influence upon the body weight. Nevertheless, I have not seen a single instance in which proper treatment ultimately failed. The latter must not be discontinued under any circumstances. The results will be obtained, in the one case, soon, in the other, later.

The variety of the metabolic type in which there is an accumulation of fat only, in respect to exercise, should be managed on somewhat different lines. There are cases in which, as we may assume, *a priori*, the heart is always more or less involved. Although this may not be determinable without difficulty in every instance, I usu-

ally start with the descending exercise described heretofore. After the first or second week calisthenics are recommended, at first such movements as tend to strengthen the lower extremities, later such as are designed for the upper extremities and the trunk itself. At the same time gymnastics of the lungs should be insisted upon. After the third week walking in moderation should be begun. This is to be gradually increased and climbing or rowing may be added after another month or so. Calisthenics and the like should not be discontinued, but should be executed every evening before retiring. Resistance exercises should be only resorted to where the condition of the heart peremptorily prohibits any other movements.

The hydrotherapeutic measures, Turkish, Russian and Nauheim baths, deserve consideration in suitable cases. Baths at 86 F., with or without salt, also sea baths during the heated season, as a rule, may be indulged in *ad libitum*.

Medicines.—For the variety in which protoplasm and fat is increased, compound thyroid tablets, 3 or 4 a day, for two or three weeks, should be taken; then continued in the same dose at intervals of two weeks for one week at a time, and to be continued for from three to six months. For that variety in which fat alone is increased, compound thyroid tablets, 3 a day, for eight or ten days. Thereafter 2 tablets every other day for a month.

Hydroplasmic Obesity.—Objects to be attained: Reduction of absolute weight; increase of corporeal specific gravity; augmentation of tissue oxidation, and increase of cardiac tonus.

Diet.—Per kilogram of normal body weight for 24 hours should be of albumins 3.4 grams or 13.94 calories, carbohydrates 1.6 grams or 6.56 calories, and of hydrocarbons 0.5 grams or 4.65 calories, a total of 25.15 calories. The amount of water should be 20 c.c. Thus a female, aged 35, affected with hydroplasmic obesity, whose absolute weight was 87.5 kilograms, height 159 cm. (normal weight corresponding to 159 cm., height 56 kilograms), requires in twenty-four hours 1400 calories, as follows: Albumins, 190.4 grams, 781 calories; carbohydrates, 89.6, 367 calories; hydrocarbons, 28 grams, 260 calories; a total of 308 grams, or 1408 calories. The amount of water should be 1120 c.c.

These 1400 calories and 1100 c.c. of water should be divided up thus:

Meal hours.		Albumins, grams.	Carbohydrates, grams.	Hydrocarbons, grams.	Water, c.c.
Breakfast, 9 a.m.	150 c.c. tea, without milk or sugar.	46.	...	3.1	150
	125 grams cold lean roast beef.	...	...	...	...
	40 grams dry toast, 60 grams wheaten bread untoasted.	4.	34.	...	...
	150 c.c. clear soup.	1.5	...	2.	150
	6 oysters, blue points—60 grams.	5.4	3.8	1.2	...
Luncheon, 12 m.	200 grams boiled, broiled or roast meat—very lean.	70.	...	5.	...
	500 grams vegetables (Brussels sprouts, savoy, red or white cabbage, spinach, cauliflower, string beans, asparagus, prepared without flour or fat), average.	13.4	24.5	1.8	...
	170 c.c. lemonade, 1 lemon and 3 grams sugar.	...	3.	...	170
	150 c.c. coffee, without milk or sugar.	...	...	...	150
	90 grams cold beef.	33.3	...	2.3	...
Supper, 7 p.m.	2 eggs.	12.6	...	12.1	...
	50 grams rye bread.	3.	24.6	...	...
	150 c.c. tea.	...	...	...	150
On retiring and during night.	150 c.c. water.	...	...	...	150
	200 c.c. water.	...	...	...	200
Total		189.2	89.9	27.5	1120
Calories		775.7	368.6	255.8	...

A nutriment very abundant in albuminous material is best suited for instances of hydroplasmic obesity. The calories elaborated and yielded by the proteids should surpass both those derived from the carbohydrate and hydrocarbon ingesta together. While in the normal state but the sixth part of all calories should have emanated from nitrogenous substances, more than half of the total heat units in hydroplasmic polysarcia must be liberated by that source. The ratio of carbohydrates to hydrocarbons in this specific diet in physiologico-chemical respects is immaterial; for practical purposes, however, in order to facilitate the continued ingestion of large amounts of proteids, the absolute weight of the carbohydrates should exceed that of the hydrocarbons at least three times. A diet offering this composition should be continued for months, or, if need be, years. It contains, on the one hand, sufficient elements for the protection of or even increase of the body albumin, and, on the other, not enough of that kind of material which prevents disintegration of adipose tissue.

That proteids are the rational nutriment in this condition is evinced by the increased heart action following their supply. When the circulatory apparatus again performs its functions with sufficient vigor the body density will soon attain a normal degree. The decline of body weight in this form of polysarcia is of secondary consideration, the most potent factor to be accomplished is increase of body density. The patient, after being properly treated for some months, may present a totally different appearance. His rotundity may have disappeared, his cheeks may have sunken in, and in spite of these facts he may have lost but a few kilograms in absolute weight. His muscular system, in the meantime, has become firmer, while fat and water have slowly disappeared. The patient in this condition, being no longer hydremic, belongs to the second variety of metabolic obesity, and, although the diet for hydroplasmic polysarcia should be continued for a more or less protracted period, the exercises designed for that variety should be employed in order to gradually effect the reduction in absolute weight.

Water.—The relative great quantity of water contained in the hydroplasmic organism, *a priori* contraindicates the introduction of much liquid. The amount of water necessary per day and kilogram was estimated by the writer to be 20 c.c. A still more limited water supply, as is recommended by some authorities, I admit is followed by the rapid loss of a few kilograms of body weight. However, this occurs by dehydration only, while the fat deposits themselves are not altered. Total withdrawal of liquids, as shown by Niederstein,¹⁴ is followed by decline in body weight. The latter increases soon after water is again taken. The early increase after the taking again of liquids, is due to the retention of water. The artificial and rapid concentration of blood serum and other body fluids may cause emaciation by starvation, but is certainly not followed by a physiologic reduction. The elimination of water from the tissues can be successfully accomplished—successful in the sense of removing the underlying cause—by but one means, the increased tonicity of the heart. By rapid concentration of serum the latter will never be realized. A certain amount of water is necessary in order that the tissues derive the utmost benefit from the organic as well as the inorganic ingesta.

Exercise.—As already pointed out, the exercise devised for the second variety of metabolic obesity serves well in this form of polysarcia, provided that the individual, by dietary treatment and by exercise described

in the following, has already attained a more normal degree of density.

In starting treatment most stress should be laid on passive and resistance movements. Faradism, massage, mechanotherapy, in short, all methods contributing toward the improvement of the circulation will be followed by most beneficial results. The employment of cold hydropathic procedures, resulting in increased oxidation of fatty material, and the systematic performance of lung gymnastics, are other suitable means in the combatment of hydroplasmic obesity.

Medicines—For the heart, strychnin; for the blood, iron, and for the intestinal tract, beta naphthalin, bismuth salicylate or hydrastis canadensis. To relieve constipation, saline enemata, podophyllin, leptandrin or calomel may be given.

Thyroid, as a general rule, is contraindicated in hydroplasmic obesity.

LITERATURE.

- * 1. H. Immermann: Die Fettsucht, v. Ziemssen's Handbuch der Speciellen Path. u. Ther., vol. xiii, 2, 1879.
2. Oertel: Handbuch der allgemeinen Therapie der Kreislaufstörungen, 1884; also 20th Cent. Practice Med., vol. ii, pp. 698-699.
3. Heinrich Stern: Investigations upon Corporeal Specific Gravity, etc., Med. Rec., Feb. 9, 1901.
4. K. v. Noorden: Die Fettsucht, vii. Band, iv. Theil in Nothnagel's Specielle Pathologie und Therapie, 1900; also Ueber die Indicationen der Entfettungscuren, Sammlung Klinischer Abhandlungen, etc., 1 Heft, 1900.
5. V. Basch. Ueber latente arteriosclerose, Wiener Med. Presse, 1893, Nr. 20-30.
6. Alois Monti. Kinderheilkunde in Eingeldavstellungen. Sechstes Heft. Das Wachsthum des Kindes, etc., 1898.
7. Wilhelm Camerer: Der Stoffwechsel des Kindes von der Geburt bis zur Beendigung des Wachstums. Zweite Ausgabe, 1896.
8. Wm. Banting: Open letter, etc. London, 1862.
9. Wm. Ebstein: Die Fettleibigkeit und ihre Behandlung. Dritte Auflage, 1883.
10. H. Kisch: Die Fettleibigkeit, Stuttgart, 1888.
11. F. Hirschfeld: Die Behandlung der Fettleibigkeit, Zeitschrift für Klinische Med., xxii, 1893.
12. Ewald: Ueber therapeutische Anwendung der Schilddrüsenpräparate Verhandlungen des Congresses für innere Med., 14, 100-136.
13. Bédart et Mabilie, Compt. rend de la Société biol. 50, 556-557.
14. F. Niederstein. Flüssigkeitsentziehung bei der Behandlung von Fettleibigkeit. Inaugural Dissertation, Tübingen, 1899.

THE MODERN SUBJECTION OF SCIENCE AND EDUCATION TO PROPAGANDA.*

PROF. WM. T. SEDGEWICK.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.
BOSTON.

One of the sad pages in the history of science and education is that which relates how, on the death of Alexander the Great, the teacher of his youth, the much greater Aristotle, rightly regarded by the Middle Age as the "master of those who know" when more than sixty years old was driven from Athens into exile by a patriotic propaganda of the anti-Macedonians. A darker and a bloody page tells how Hypatia of Alexandria, the beautiful and learned daughter of Theon, was cruelly and brutally murdered in a Christian church in the year 415 of our era as a victim of a fanatical propaganda against paganism, condoned, if not conducted, by the Christian Archbishop Cyril, Patriarch of Alexandria. Copernicus hesitated long before publishing his splendid discoveries on the movements of the heavenly bodies and the heliocentric theory, for fear of ecclesiastical interference, and when soon after Galileo, more bold, promulgated the truth that Copernicus had hesitated to pronounce, both he and his discoveries fell under the severest ecclesiastical condemnation ever visited upon any man of science for the truth alone.

In our own time we have too often heard of sects which place the propaganda of a special faith before either science or education, and inquire more carefully into the orthodoxy of professors and pupils than into their scientific or educational attainments. However much we may regret such action we can not legitimately complain so long as the sectarians in question confine their actions to sectarian schools; colleges

* Abstract of the President's Address delivered before the American Society of Naturalists, Jan. 1, 1902.