SOUTHERN
MEDICAL AND SURGICAL JOURNAL.
(NEW SERIES.)

Vol. XVI. AUGUSTA, GEORGIA, DECEMBER, 1860. NO. 12

ORIGINAL AND ECLECTIC.

ARTICLE XXIV.

FIRST REPORT TO THE "COTTON PLANTERS' CONVENTION" OF GEORGIA.

On the Tertiary Lime Formation of Georgia, by JOSEPH JONES, M. D., Professor of Chemistry in the Medical College of Georgia, and Chemist of the Cotton Planters' Association.

(CONTINUED.)

THAT OF 1859.

Gypsum	39.31	⅓ct.	$0.13
Phosphoric Acid insoluble . .	7.06	4½ct.	0.31¾
" " Soluble . .	6.27	12½ct.	0.78½

The value of 100 lbs. being multiplied by 20, gives the value of a ton of each.

Thus, that of 1858 is worth	$33.20
1859 " " . . .	24.60
Difference against the latter . . .	$9.60

The proportion of Ammonia was two small in either to be worthy of notice.

Comment is unnecessary. I have given the chemical constitution and its money value, so that the farmer may really know what he is buying.

The result of all this shows a great falling off in the value of three manures, which have been much used in Maryland, whilst in two others (Coe's & Rhode's) the quality has been generally maintained.

What quantities of these inferior articles have been sold to our farmers because of their original reputation cannot be ascertained, but it would seem that means should be taken to arrest such frauds.

It is felony to obtain money or goods under false pretences, and people are punished criminally for such acts. Is it not equally criminal in morals, if not in law, to publish certificates of the existence of certain proportions of valuable matter in a manure, and yet sell a material containing perhaps one-third or one-half the amounts stated in such certificates?

After consultation with many farmers and planters, and seriously reflecting upon this subject, I am fully satisfied that if a proper sum be allowed me for such assistance as will permit a comprehensive system of analysis to be executed, the evil will be very soon corrected.

The conscientious maker or dealer will of course furnish fair samples; but as there might be some who would act otherwise, I would propose to take such means as would insure samples of the articles actually received by the farmer.

such a number of each kind used in this state should be analyzed from time to time as will keep the public informed of their composition and value.

The law might require them to be reported monthly or quarterly to the Governor or other officer, and published in one or more papers in each county, as in the case of the laws.

The effect of these measures would not fail to afford ample protection to the farmer against both fraud and ignorance, and whilst benefiting the honest dealers would very soon drive all others out of the trade."

First Report of Philip T. Tyson, State Agricultural Chemist to the House of Delegates of Maryland, January 1860 pp. 101–102, pp. 130–132.

I have selected the testimony of Professor Tyson because he is the appointed chemist of a State from which

we receive a large portion of our Guanos and manufactured manures.

It should be remembered by the Planters of Georgia, that in most instances, the manufacturers of these compounds are residents of distant States, and that the venders, in our midst are also in many instances natives of distant States—birds of passage, who come merely to make a fortune and then to migrate to colder regions. It results from this, that whatever losses of money occur in the purchase of fertilizers they are in almost every case total losses to the State of Georgia, for the money does not simply change hands amongst her own citizens, but is carried out of the State.

The only method of protecting the planters, is that recommended to the House of Delegates of Maryland by Mr. Tyson.

A law should be passed compelling the venders of fertilizers to throw open their entire stock to the inspection and examination of competent chemists. No honest man will object to this test. Dishonest men will always endeavor to defeat the execution of the law. Every attempt to elude a fair examination, should of itself be sufficient warning to the Planters of Georgia that there is fraud.

We will now institute a careful and impartial comparison between the commercial fertilizers, and Marls and Shell Limestone of Georgia.

In this comparison, it would be manifestly unjust to compare pound with pound in the commercial and native fertilizers; to render the comparison just and equal, we must compare the amounts necessary for each acre of land.

The following table presents the composition of the Shell Limestone and Marls of Georgia in tons and bushels, and in comparing it with the preceding tables of the chemical constitution of the commercial fertilizers, we should compare bushels with pounds.

TABLE 18—Showing the Chemical Composition of the Shell Limestone and Marls of Georgia in Tons and Bushels.

	Carb. of Lime	Lime	Phosp'te of Lime	Phosphoric Acid	Carb. Magnesia	Sulphate Lime	Sulphuric Acid	Chlorides	Alumina & Oxide of Iron	Insol. Silicates	Silicious Sand	Water as Moist.	Organic Matter
Green Marl, 100 parts contain	43.435	24.282	3.649	1.677	0.270	trace	trace	0.014	7.196	31.941	8.055	5.714	.....
One Ton of 2,000 pounds contain	868.700	485.64	72.980	33.540	5.400	.....	.....	0.280	143.92	638.82	161.100	114.28	.....
One Hundred bushels contain	4343.	2428.	364.9	167.7	27.	.....	.....	1.4	719.	3194.	805.	571.	.....
200 bushels contain	8686.	4856.	729.8	335.4	54.	.....	.....	2.8	1439.	6388.	1601.	1143.	.....
300 bushels contain	13029.	7284.	1094.7	503.4	81.	.....	.....	4.2	2158.	9582.	2415.	1714.	.....
400 bushels contain	17372.	9712.	1459.6	690.8	108.	.....	.....	5.6	2878.	12776.	3222.	2285.	.....
500 bushels contain	17715.	12141.	1820.5	838.5	135.	.....	.....	7.0	3598.	15970.	4027.	2857.	.....
1,000 bushels contain	43430.	24286	3649.	1677.	270.	.....	.....	14.	7196.	31941.	8050.	5714.	.....
Yellow Marl, 100 parts contain	43.023	24.98	6.465	2.971	0.841	0.002	0.002	0.01	0.265	40.178	5.62	3.1	.....
One Ton of 2,000 parts contain	860.46	499.86	129.30	59.42	16.82	0.04	0.02	0.2	5.3	803.56	112.4	62.0	.....
100 bushels contain	4302.	2499.	646.5	297.1	84.	0.2	0.1	1.0	26.	4017.	562.	310.	.....
200 " "	8604.	4998.	1293.0	594.2	168.	0.4	0.2	2.0	53.	8035.	1124.	620.	.....
300 " "	12906.	7497.	1939.5	891.3	252.	0.6	0.3	3.0	79.	12053.	1686.	930.	.....
400 " "	17208.	9997.	2586.0	1188.4	336.	0.8	0.4	4.0	105.	16071.	2248.	1240.	.....
500 " "	20510.	12496.	3232.0	1485.	420.	1.0	0.5	5.0	132.	2248.	2810.	1550.	.....
1000 " "	43020.	24993.	6465.0	2971.	841.	2.0	1.0	10.0	265.	1240.	5620.	3100.	.....
White Shell Limestone 100 parts contain	87.742	49.192	0.933	0.427	0.770	0.103	.....	0.005	0.266	4.552	4.062	0.117	.....
One Ton of 2,000 pounds contain	1755.	983.	18.66	854.	3.4	2.06	.....	0.1	5.32	91.	81.	2.3	.....
One Hundred bushels contain	8774.	4919.	93.3	42.7	77.	10.3	.....	0.5	26.6	455.	406.	11.7	.....
200 " "	17548.	9838.	186.6	85.4	154.	20.6	.....	1.0	53.2	910.	812.	23.4	.....
300 " "	25322.	14757.	279.9	128.1	231.	30.9	.....	1.5	79.8	1365.	1218.	35.1	.....
400 " "	35096.	19676.	373.2	170.8	308.	41.2	.....	2.0	106.4	1820.	1624.	46.8	.....
500 " "	43870.	24596.	465.5	213.5	385.	51.5	.....	2.5	133.0	2276.	2031.	58.5	.....
1000 " "	87742.	49192.	933.0	427.	770.	103.	.....	5.0	266.	4552.	4062.	117.0	.....

TABLE 18—Continued.

	Carbonate Lime.	Lime.....	Phosphate Lime	Phosphoric Acid in Phosphate of Lime.....	Carb. Magnesia.	Sulphate Lime..	Sulphuric Acid..	Chlorides.....	Alumina & Oxide of Iron.....	Insol. Silicates.	Silicious Sand.....	Water as Moist..	Organic Matter.
White Shell Marl, 100 parts contain.....	71.932	40.282	0.426	0.196	0.028	0.001	.....	0.005	1.248	19.062	5.466	0.842	.....
One Ton of 2,000 pounds contain.....	1438.	633.	8.52	3.920	0.56	0.02	.....	0.10	24.9	381.	119.	16 8	.....
100 bushels contain.....	7932.	4028.	42.6	19.6	2.8	0.1	.....	0.5	124.	1906.	546.	84.	.....
200 " "	15864.	8056.	85.2	39.2	5.6	0.2	.....	1.0	249.	3812.	1093.	168.	.....
300 " "	23796.	1208.	127.8	58.8	8.4	0.3	.....	1.5	373.	5718.	1639.	252.	
400 " "	31728.	16112.	170.4	78.4	11.2	0.4	.....	2.0	498.	7624.	2186.	336.	.....
500 " "	39660.	20140.	213.0	98.0	14.0	0.5	.....	2.5	624.	9530.	2733.	420.	.....
1000 " "	79320.	40.280	426.0	196.0	28.0	1.0	.....	1240.	1240.	1240.	5460.	1680.	.....
Bluish Black Marl 100 parts contain.....	9.739.	5.454	0.615	0.283	0.030	.....	.....	0.120	1.140	32.190	47.113	6.628	1.398
One Ton 2.000 pounds contain	194.	109.80	12.2	5.66	0.6	.....	.....	2.4	22.8	643.	943.	133.5	27.960
100 bushels contain	973.9	545.	61.5	28.	3.	.....	.....	12.	114.	3219.	4717.	662.	139.8
200 " "	1947.8	1090.	123.0	56.	6.	.....	.....	24.	228.	6438.	9434.	1325.	279.6
300 " "	2921.	1635.	184.5	88.	9.	.....	.....	36.	34.2	9657.	13151.	1988.	419.4
400 " "	3895.	2180.	246.0	112.	12.	.....	.....	48.	456.	12876.	18868.	2651.	559.2
500 " "	4867.	2725.	307.5	140.	15.	.....	.....	60.	570.	16077.	23585.	3314.	699.0
1000 " "	9739.	5450.	615.0	280.	30.	.....	.....	120.	1140.	32190.	47170.	6628.	1398.
Swamp Deposit, 100 pounds contain..	2.083	1.167	0.292	0.134	0.009	.....	.....	.....	1.329	28.4	.....	64.7	2.912
One Ton 2,000 pounds contain	41.66	23.34	5.84	2.68	0.180	.....	.....	.....	26.58	568.	.....	1294.	58.24
100 bushels contain	208.3	116.7	29.2	13.4	0.9	.....	.....	.....	132.	2840.	.....	6471.	291.
200 " "	416·6	233.4	58.4	26.8	1.8	.....	.....	.....	265.	5681.	.....	12942.	582.
300 " "	624.9	350.1	87.6	40.2	2.7	.....	.....	.....	398.	8522.	.....	19414.	873.
400 " "	833.2	468.	116.8	53.6	3.6	.....	.....	.....	551.	11363.	.....	25885.	1164.
500 " "	1041.	583.	146.0	68.0	4.5	.....	.....	.....	664.	14204.	.....	32357.	1456.
1000 " "	2083.	1167.	292.0	134.	9.	.....	.....	.....	1329.	28409.	.....	64714.	2912.

TABLE 18—Continued.

	Carbonate Lime.	Lime	Phosphate Lime	Phosphoric Acid in Phosphate of Lime.....	Carb. Magnesia.	Sulphate of Lime	Sulphuric Acid.	Chlorides.....	Alumina and Oxide of Iron	Insol. Silicates.	Silicious Sand..	Water as Moistur	Organic Matter.
Swamp Deposit, Dry 100 parts contain.....	6.808	3.813	0.822	0.378	0.29	trace	.....	.....	3.766	80.20	.....	.....	8.221
One Ton of 2000 pounds contain	136.16	76.26	16.44	7.56	0.58	.....	.....	.....	75.	1604.	.....	.....	164.42
100 bushels contain.....	680.8	381.	82.2	37.8	2.9	.....	.....	.....	376.	8021.	.....	.....	822.
200 " "	1362.6	762.	164.4	75.	5.	.....	.....	.....	753.	16042.	.....	.....	1644.
300 " "	2042.4	1043.	246.6	113.	8.	.....	.....	.....	1128.	24063.	.....	.....	2466.
400 " "	27232.	1524.	328.8	151.	11.	.....	.....	.....	1504.	42084.	.....	.....	3288.
500 " "	3404.	1805.	410.0	189.	14.	.....	.....	.....	1880.	40105.	.....	.....	4110.
1000 " "	6808.	3810.	822.	378.	29.	.....	.....	.....	3766.	80211.	.....	.....	8221.
Reddish Brown Marl, 100 parts contain	42.389	23.738	0.218	0.1	0.157	trace	trace	trace	2.265	23.346	22.9	8.102	.....
One Ton 2,000 pounds contain....	847.78	474.	4.36	2.0	3.14	.....	.....	.....	45.3	466.9	458.	162.	.....
100 bushels contain.....	4238.	23.73	21.8	10.0	15.7	.....	.....	.....	226.	2334.	2290.	810.	.....
200 " "	8476.	4647.	43.6	20.	31.4	.....	.....	.....	453.	4669.	4580.	1620.	.....
300 " "	12704.	7121.	64.4	30.	47.1	.....	.....	.....	679.	7003.	6870.	2430.	.....
400 " "	16952.	9485.	87.2	40.	62.	.....	.....	.....	906.	9338.	9160.	3240.	.....
500 " "	21190.	11869.	109.0	50.	78.	.....	.....	.....	1132.	11672.	11450.	4050.	.....
1000 " "	42380.	23730.	218.0	100.	157.	.....	.....	.....	2265.	23340.	22900.	8100.	.....
Reddish Brown Marl, natural state, 100 parts cont'd	15.473	8.665	0.349	0.161	trace	trace	trace	0.086	2.005	42.662	16.942	21.85	.....
One Ton 2,000 pounds contain.....	30.946	173.3	6.98	3.23	.....	.....	.....	1.726	40.1	853.	338.	427.1	.....
100 bushels contain.....	1547.	866.	34.9	16.1	.....	.....	.....	8.0	200.	4266.	1694.	2185.	.....
200 " "	3094.	1733.	69.8	32.2	.....	.....	.....	17.3	401.	8532.	3388.	4371.	.....
300 " "	4541.	2599.	104.7	48.3	.....	.....	.....	25.8	601.	12798.	5082.	6556.	.....
400 " "	5188.	3466.	135.6	64.4	.....	.....	.....	34.4	802.	17064.	6776.	8742.	.....
500 " "	7735.	4332.	174.5	70.5	.....	.....	.....	43.0	1002.	21330.	8270.	10928.	.....
1000 " "	15470.	8660.	349.	161.	.....	.....	.....	86.	2005.	42660.	16940.	21850.	.....
Reddish Brown Marl, 100 parts contain.....	19.799	11.087	0.446	0.206	.....	.....	.....	0.107	2.865	54.594	21.68.	.....	.....
One Ton of 2000 pounds contain.....	395.98	221.7	8.92	4.12	.....	.....	.....	2.140	5.134	1091.	633.	.....	.....
100 bushels contain.....	1979.9	1108.	44.6	20.6	.....	.....	.....	10.7	256.	5459.	2168.	.....	.....

TABLE 18—Continued.

	Carbonate Lime.	Lime.....	Phosp'te of Lime	Phosphoric Acid in Phosphate of Lime.....	Carb. Magnesia.	Sulphate of Lime	Sulphuric Acid..	Chlorides.....	Alumina and Oxide of Iron....	Insol. Silicates.	Silicous Sand...	Water as Moist..
Reddish Brown Marl, 200 bushels contain.....	3959.	2217.	89.2	41.2	.....	.....	.....	21.4	513.	10918.	4336.	.....
300 " "	5939.	3326.	133.8	61.8	.....	.....	.....	32.1	719.	16378.	6504.	.....
400 " "	7919.	4434.	178.4	82.4	.....	.....	.....	42.8	102.6	21837.	8672.	.....
500 " "	9899.	5543.	223.0	102.0	.....	.....	.....	53.5	1282.	26297.	10850.	.....
1000 " "	19799.	11087.	445.	206.	.....	.....	.....	107.	2575.	54594.	21680.	.....
White Shell Limestone, 100 parts contain.....	80.076	44.843	1.181	0.544	0.009	0.004	.....	0.009	0.694	4.018	13.08	0.681
One Ton of 2,000 pounds contain.....	1615.2	896.8	23.62	10.88	0.180	0.080	.....	0.180	13.88	80.36	261.6	13.62
100 bushels contain.....	8007.	4484.	118.1	54.4	0.9	0.4	.....	0.9	69.	401.8	1308.	68
200 " "	16015.	8968.	236.2	108.8	1.8	0.8	.....	1.8	138.	803.	2616.	136.
300 " "	24022.	13452.	354.3	173.2	2.7	1.2	.....	2.7	218.	1205.	3924.	204.
400 " "	32030.	18936.	472.4	217.6	3.6	1.6	.....	3.6	277.	1607.	5232.	272.
500 " "	40038.	22421.	590.5	272.0	4.5	2.0	.....	4.5	347.	2009.	6540.	340.
1000 " "	80070.	44843.	1181.	544.	9.	4.	.....	9.	694.	4018.	13081.	681.
White Shell Limestone 100 parts contain.....	85.285	47.76	0.25	0.115	2.22	trace	trace	0.019	0.876	0.393	10.708	0.214
One Ton 2000 pounds contain.....	1705.70	955.	5.0	2.3	44.4	.....	.....	0.38	17.52	7.86	214.16	4.28
100 bushels contain.....	8528.	4776.	25.	11.5	222.	.....	.....	1.9	87.	39.3	1070.	21.
200 " "	17156.	9552.	50.	23.	444.	.....	.....	3.8	175.	78.6	2141.	42.
300 " "	25584.	14328.	75.	34.5	666.	.....	.....	5.7	262.	87.9	3212.	64.
400 " "	34112.	18004.	100.	46.	888.	.....	.....	7.6	350.	157.2	4283.	85.
500 " "	42640.	23880.	125.	57.4	1110.	.....	.....	9.5	438.	196.5	5354.	107.
1000 " "	85280.	47760.	250.	115.	2220.	.....	.....	19.	876.	393.	10708.	214.
Shell Limestone 100 parts contain.....	92.216	51.86	0.628	0.298	trace	0.300	trace	0.015	1.17	4.5	0.933	0.3
One Ton of 2,000 pounds contain..	1844.32	1030.	12.56	5.96	.....	6.00	.....	0.300	23.4	90.	18.6	6.
100 bushels contain.....	9221.	5186.	62.8	29.8	.....	30.	.....	1.500	117.	450.	93.	30.
200 " "	18442.	10372.	125.6	59.6	.....	60.	.....	3.0	234.	900.	186.	60.
300 " "	27663.	15558.	188.4	89.4	.....	90.	.....	4.5	351.	1350.	279.	90.
400 " "	36884.	20074.	251.2	119.2	.....	120.	.....	6.0	468.	1800.	373.	120.
500 " "	46105.	25950.	514.0	149.0	.....	150.	.....	9.5	585.	2250.	466.	150.
1000 " "	92210.	51860.	628.0	298.	.....	300.	.....	15.	1170.	4500.	930.	300.

The careful comparison of the individual elements of the commercial fertilizers with the individual elements of the Tertiary Lime formation of Georgia establishes the following results and conclusions.

1. 100 bushels of the Green Marl contains four times more Phosphoric Acid, and as a necessary consequence four times more phosphate of lime than one hundred pounds of Phosphatic, Amonia Phosphatic, and Peruvian Guanos, or of any other commercial fertilizer.

2. 100 bushels of the Yellow Marl contains eight times more Phosphate of Lime than one hundred pounds of any known Guano or manufactured manure.

It would be perfectly safe to apply one hundred pounds of these Marls to any land in Georgia, and if the lands be newly cleared and rich in organic matters we might double and treble the amount.

The experiments of Senator Hammond and others have rendered it at least probable that the lands of South Carolina and Georgia will not bear as heavy applications of Marl as the lands of England, Virginia and Maryland, and hence I would not until Careful experiments have determined the exact amount of Marl which is sufficient for our lands in Georgia, recommend the application of this Green and Yellow Marl upon sandy cultivated lands, in larger amounts than 200 bushels.

When I have completed the chemical analysis of the soils of Georgia, I hope to be able to speak with more precision.

It is evident, nevertheless, that even with this small amount to each acre, the Marls of Georgia will furnish far more phosphoric Acid and Phosphate of lime than the expensive commercial fertilizers which we have shown to be also liable to adulteration.

In making this comparison we have impartially compared these Marls with the very best fertilizers in the market.

3. 100 bushels of the White shell Limestones Nos. 3, 11 and 13 contain a greater amount of Phosphate of lime than exists in 100 pounds of the great majority of the Guanos and manufactured compounds.

4. 100 bushels of the Marls and Shell Limestone which contain the least Phosphate of Lime, contain fully as much as the most inferior Guanos and manufactured manures.

5. It would be safe to apply 1000 bushels of the Bluish Calcareous Clay, which we have for convenience called a Bluish Black Marl, although it contains less Carbonate of Lime than usually exists in Marls, to each acre of land. In this amount we would obtain 610 pounds of Phosphate of Lime, an amount at least twice as great as that contained in a most liberal application of the best Guanos and commercial manures. Hence with truth I affirmed that this bluish black Marl would be a most valuable fertilizing agent to the surrounding exhausted sandy lands. The clay itself which it contains will prove a valuable addition to the lands which need clay. It is evident however that this calcoreous earth would not bear a long transportation either on the farm or on the Railroad, for it contains too much clay.

6. It would be safe to apply 1000 bushels of the Black swamp deposit, No. 7, (which we have called swamp muck for this was the name by which it was designated by the surrounding inhabitants) to each acre of land. In this amount we would apply as much Phosphate of Lime as is contained in 1000 pounds of the very best Phosphatic Guanos, and in addition to this we will apply together with the Phosphate 8221 pounds of Organic matters, and 6808 pounds of Carbonate of Lime. Although the organic matters are not as soluble, or as valuable sources of Ammonia, as the organic matters, of Phosphatic and Ammonia Phosphatic Guanos, still it is well known to every chemist, that lime promotes the disintegration of the most stable and insoluble compounds, hence the deposits of swamps and peat bogs which are comparatively inert, are readily decomposed and prepared for vegetation by the action of Carbonate of Lime.

The value of this black swamp deposit would on this very account be increased by mixing it intimately with one

quarter of its weight of pounded Shell Limestone or one twentieth of Lime.

This would be easily accomplished, for the surrounding hills are composed in great measure of Shell Limestone. It should be borne in mind that a less quantity of the mixture should be added to the land.

The remarks which we made with reference to the Bluish Black Marl, or Calcareous earth, apply also to this Black Swamp deposit.

7. 200 bushels of the Reddish Brown Marls would contain as much Phosphate of lime as is found in the Guanos and manipulated compounds of medium quality.

To render these facts still more plain we have drawn up the following table.

TABLE 19.—Showing the comparative amounts of Phosphate of Lime in corresponding Bushels and pounds of Georgia Marl and Shell Limestone and commercial fertilizers:

	100 bushels. lbs	200 bushels. lbs	300 bushels. lbs	1000 bushels. lbs
No. 1.—Green Marl	364.	729.	1094.	7298.
No. 2.—Yellow Marl	664.	1293	1939.	12930.
No. 3.—White Shell Limestone	93.3	186.6	279.9	1866.
No. 4.—White Shell Marl	42.	85.	127.	852.
No. 5.—Bluish Black Marl	61.	123.	184.	1230.
No. 6.—Swamp Deposit	29.	58.	87.	584.
No. 7.—Dry Swamp Deposit	82.	164.	246.	1644.
No. 8.—Reddish Brown Marl	21.	43.	64.	436.
No. 9.—Reddish Brown Marl	34.	69.	104.	698.
No. 10—Dry Reddish Brown Marl	44.	89.	133.	892.
No. 11—White Shell Limestone	118.	236.	354.	2362.
No. 12.—White Shell Limestone	25.	50.	75.	500.
No. 3.—White Shell Limestone	62.	125.	188.	1256.

	100 pounds. lbs	200 pounds. lbs	300 pounds. lbs	1000 pounds. lbs
American Guano loose	50.	100.	150.	1003.
American Guano lump	59.	118.	177.	1180.
Brown Mexican Guano	35.	70.	106.	707.
do do do	36.	72.	108.	723.
do do do	52.	105.	158.	1054.
do do do	67.	135.	202.	1353.
African Guano	38.	76.	114.	762.
Brown African Guano	40.	80.	120.	804.
Javis Island Guano	16.	33.	49.	330.
White Mexican	81.	162.	243.	1620.
Columbian Guano	87.	175.	263.	1759.
Sombrero Guano	75.	150.	225.	1500.
do do	79.	159.	239.	1594.
do do	77.	155.	233.	1555.
Nevassa Guana	68.	136.	205.	1369.
ElMontana Guano	60.	120.	180.	1203.
Californria Guano	26.	52	78.	520.
do do	38.	76.	114.	760
do do	23.	46	69.	460.
Saldanha Bay Guano	56.	113.	170.	1139.

	100 pounds. lbs	200 pounds. lbs	300 pounds. lbs	1000 pounds. lbs.
Saldanha Bay Guano	58.	117	176.	1175.
do do do	60.	120	180.	1219.
do do do	54.	109.	164.	1096.
Peruvian Guano	25.	50.	75.	500.
do do	41.	82.	123.	820.
do do	30.	60	90.	600.
do do	31.	62	93.	620
do do	21.	42.	63.	420.
do do	31.	62.	93.	620.
do do	19.	38.	57	380.
Grass Manure	21.	62.	93.	620.
Rhodes Superphosphate	46.	92	138.	920.
do do	44.	88.	132.	880.

8. In the preceding calculations we have left entirely out of view the important fact that these Marls and Shell Limestone contain Carbonate of Lime, which is considered by the most experienced agriculturists to play even a more important part in the economy of vegetation and in the chemical changes of the soil, than the Phosphate of lime.

Thus in 100 bushels of Green Marl we would have 4383 pounds of Carbonate of Lime, in the Yellow Marl, 4302 pounds, in the other Marls from 200 to 4238 pounds and in the Shell-Limestone from 7932 to 9221 pounds of Carbonate of Lime

CONCLUSIONS.

1. The Tertiary Lime-formation of Georgia is capable of supplying the entire State with the Phosphates and Carbonates of Lime for unnumbered ages.

2. If the planters of Georgia employ the natural resources of their State, they will have no need whatever to purchase a single pound of Phosphate of Lime in whatever form it be present in the market.

3. The application of Phosphatic Guanos and superphosphates to soils to which the Marls and Shell-Limestone of Georgia have been applied, would be wholly unnecessary and would produce no special beneficial effect. The truth of this assertion has been demonstrated in those states and countries in which Marls rich in the phosphates have been applied to the soil.

4. In as much as Peruvian Guano contains a large proportion af Ammonia and of organic compounds, capable of generating Ammonia during decomposition in the soil, it is far more suitable as an application to Marled lands than the Phosphate of Lime and Phosphatic Guanos. The high price of Peruvian Guano, however will be a serious obstacle to its extensive use; and we shall endeavor to demonstrate before we leave this subject, that the planters of Georgia do not need Peruvian Guano or any other commercial fertilizer as sources of Ammonia and of the inorganic compounds necessary to the developement of Plants, and the improvement of the soil.

We will in the next place consider the relations to soils, plants and animals, and the effects and mode of application of the Marls and Shell-Limestone of Georgia. It will be impossible upon the present occasion to do more than present general and well established results and conclusions.

The whole subject will be fully and carefully discussed in the large report which we expect to present to the cotton planters convention, when the Agricultural Survey of Georgia is completed.

V. Relations of Marls and Shell Limestone to Soils.

That lime is indispensable to the fertility of the soil, has been demonstrated by the universal experience of agriculturists, and by the important results attained by the application of calcareous manures to lands of every geological formation, and of every quality, and by the known chemical and physical effects of lime and its compounds upon the constituents of soils and of animal and vegetable manures.

The full discussion of the relations of lime to soils and to plants and animals would fill a volume and must necessarily be deferred for the present. We hope, however to present such an array of facts and results as will lead to intelligent and efficient action.

The following well established facts will serve the purpose of demonstrating the proposition that lime is indispensable to the fertility of the soil.

Soils devoid of lime, no matter what other salts they may contain are in all countries barren.

The addition of calcareous manures to soils deficient in lime changes both their physical and chemical characters, and if the other salts necessary for vegetation, be either present as constituents of the soil, or be added in the form of manure, renders them fertile.

Chemical analysis has shown that lime and its compounds are present in all fertile soils.

We would hope that those who deny that lime is necessarily present in all fertile soils constitute but a small class amongst practical agriculturists.

To place this proposition in a clear light and to demonstrate it beyond all contradiction and at the same time to develope important facts to guide the planter in the application of lime to various soils, we have drawn up the following tables which embody reliable results obtained in Europe and this country.

In every case the entire series have been selected so that the examples brought forward to prove that lime is a constituent of all fertile soils are free from every objection.

TABLE 20.—ANALYSIS OF THE SOILS OF DIFFERENT LOCALITIES IN EUROPE.—KANE.*

Each soil dried at 100° CONSTITUENTS.	No. 1. Heerstert, near Corstray.....	No. 2. Escamaffles, best flax land in Corstray.....	No. 3. Hamme Log, best flax land in Antwerp.....	No. 4. A district yielding only thin crops of coarse flax.....	No. 5. A good flax district in Holland....	No. 6. Crowle in Lincolnshire, so-called "Warp".....
Potassa.....	0 160	0.123	0.068	0.151	0.583	0.534
Soda.....	0.298	0.146	0.110	0.206	0.306	0.083
Sesquioxide of iron...	3.298	1.663	1.202	1.543	6.047	4.510
Sesquioxide of manganese.....	trace.	trace.	trace.		trace.	decided trace
Alumina.....	2 102	1.383	1.125	0.988	5 626	3.065
Lime.....	0.357	0.227	0.481	0.366	3.043	5.538
Magnesia.....	0.202	0.153	0.140	0.142	0.105	0.052
Sulphuric Acid.....	0.025	0 017	0 013	0.026	0 023	0.113
Phosphoric Acid.....	0.121	0.152	0.064	0.193	0.159	0.222
Chloride of Sodium....	0.017	0.030	0.067	0.009	0.023	0.067
Clay.....	14.920	9.280	5.760	4.400	17 080	
Sand.....	75.080	84.065	86.797	88.385	60.947	80.702
Organic matter, remainder of the moisture.....	3.123	2.361	4.209	3.672	5.841	5.328
Loss.....	0.297	0.400	9.025		0.217	
	100.000	100 000	100.000	100 081	100.000	100.204

*Phil. Mag. [3], xxxi, 36 and 105. Liebig and Kopps Annual Report in Chemistry, &c., vols. 1 and 2, p. 328

TABLE 21.—ANALYSES OF SOILS OF EUROPE*

Number		1			2			3			4		
		Weidenbusch.	Varrentrapp.	Steinberg.	Rammelsberg.	Hagen.	Nitzsch.	Hagen.	Nitzsch.	Rammelsberg.	Bodeker.	Marchand	Trommer.
		Soil of Eldena.			Soil of Wollup.			Soil of Beesdau.			Soil of Neuensund.		
Organic substance.	Carbon	0.53	1.00	1.00	1.810	3.197	2.570	1.438	1.486	0.811	1.243	1.108	1.137
	Nitrogen	0.11	0.12	0.11	0.200	0.298	0.271	0.137	0.249	0.108	0.147	0.103	0.010
	Hydrogen	0.24	1.25	0.21	7.120	0.697	0.692	0.289	0.423	2.518	0 173	3.329	2.383
	Oxygen	....		1.52		4.363	5.550	2.102	3.399		2.544		
	Sulphur	....	....	....	....	....	....	....	....	....	0.007	....	0.044
Soluble in dilute hydrochloric acid.	Chlorine	0.20	0.01	0.01	0.003	trace	0.023	trace	0.121	0.003	0.005	0.032	0.005
	Carbonic acid	0.40	0.10	....	0.063	....	....	0.036	....	trace	0.372	0.380	0.263
	Sulphuric acid	0.08	....	0.02	0.002	....	0.099	....	....	0.004	0.050	0.038	0.241
	Phosphoric acid	0.06	0.17	0.40	0.009	0.169	0.832	0.042	0.046	0.007	0.103	0.010	0.121
	Silicic acid	0.85	....	0.24	....	2.375	....	....	....	....	1.881	0.291	....
	Sesquioxide of iron	0.16	0.93	1.28	2.229	3.765	5.711	0.949	1.361	1.149	0.130	2.447	1.472
	Sesquiox. of manganese	0.94	....	0.37	....	....		....			0.145	0.011	0.479
	Alumina	2.78	0.57	0.05	0.478	5.031	2.324	1.322	1.749	0.369	0.649	2.198	1.964
	Lime	0.39	0.12	0.25	0.595	0.617	0.591	0.334	0.039	0.325	0.341	0.329	0.577
	Magnesia	0.17	....	2.28	0.085	0.295	0.428	0.095	0.355	0.057	0.143	0.341	0.198
	Potassa	0.38	0.13	....	0.027	0.337	0.176	0.419	0.490	0.060	0.047	0.247	0.192
	Soda	0.27	0.05	....	0.006	0.116	0.405	0.038	0.022	trace		0.039	0.050
	Chloride of sodium	....	....	....	....	....	....	....	....	....	....	....	....
Insoluble in dilute hydrochloric acid.	Silicic acid	86.25	87.29	88.63	63.642	72.400	71.474	83.600	86.083	87.581	79.537	83.935	82.954
	Sesquioxide of iron	1.78	1.15	0.71	5.697	....	4.420	trace	0.874	1.092	0.690	0.979	0.783
	Sesquiox. of manganese	....	....		....	....		....			....	trace	0.110
	Alumina	3.39	3.92	4.71	10.948	4.309	3.055	6.892	2.230	2.671	4.526	2.092	4.845
	Lime	....	0.63		0.940	0.272	0.480	0.468	....	0.390	1.043	0.285	0.151
	Magnesia	....	0.28	0.12	2.234	0.246	....	....	0.105	1.078	0.526	0.178	0.204
	Potassa	0.55	1.93		2.645	1.434	0.117	3.406	....	0.732	3.388	1.042	1.051
	Soda	0.40	0.33		1.267	0.722	0.395	....	0.654	1.045	2.259	0.507	0.766
Total		98.95	99.98	99.908	100 000	100.643*	99.613	101.567	99.686*	100.000	100.000	100.000 $0.061NH^3$ and $0.044NO_5$	100.000

*Besides carbonate of ammonia.

*Annual report of the Progress of Chemistry and the Allied Sciences, by Justus Liebig and H. Kopp, vol. II, 1849, p. 463.

TABLE 22.—ANALYSES OF SOILS OF EUROPE.*

Number		5			6			7			8		
		Bodeker.	Marchand	Trommer.	Schulze	Schulze	Birner	Schulze	Schulze	Birner.	Genth.	Heintz.	Krocker
		Soil of Cartlow.			Soil of Burg-Bornheim.			Soil of Laasan.			Soil of Turwe.		
Organic substance.	Carbon	0.935	0.979	0.886	1.109	1.147	0.900*	1.285	1.325	1.004*	1.760	1.34	1.290
	Nitrogen	0.076	0.106	0.005	0.102	0.114	1.409†	0.112	0.113	1.812†	0.140	0.13	0.173
	Hydrogen	0.119	1.915	1.749	2.062	1.989	....	2.252	2.165	....	3.615	0.52	2.187
	Oxygen	1.962										2.45	
	Sulphur	0.058	....	0.002	0.008	....	....	0.006	....	....	....	0.009	....
Soluble in dilute hydrochloric acid.	Chlorine	0.014	0.003	0.002	0.002	0.003	0.027	0.005	0.004	0.017	0.010	....	0.005
	Carbonic acid	0.033	0.086	....	....	....	0.098	....	....	0.101	0.077	1.69	2.328
	Sulphuric acid	0.012	0.030	0.030	0.030	0.035	0.023	0.040	0.040	0.031	0.040	0.03	0.022
	Phosphoric acid	0.006	0.007	0.009	0.084	0.072	0.003	0.100	0.107	0.012	0.057	0.20	0.014
	Silicic acid	0.027	0.450	....	0.010	0.018	....	0.014	0.008	....	0.701	.. .	0.196
	Sesquioxide of iron	1.169	1.210	1.268	2.520	1.824	2.316	1.652	1.530	1.552	0.459	0.68	0.794
	Sesquiox. of manganese	0.022	0.001	0.181	0.104	0.092	trace	0.124	0.112	trace	trace	....	0.139‡
	Alumina	0.232	1.488	1.439	1.512	1.602	1.228	1.576	1.690	1.184	0.810	1.12	1.040
	Lime	0.391	0.099	0.235	0.212	0.298	0.232	0.144	0.166	0.273	2.062	2.19	3.169
	Magnesia	0.101	0.047	0.097	0.178	0.216	0.299	0.136	0.148	0.217	0.641	0.58	0.043
	Potassa	0.132	0.203	0.160	0.122	0.109	0.159	0.104	0.122	0.121	0.102	0.56	0.113
	Soda	0.271	0.090	0.013	0.030	0.045	0.079	0.058	0.025	0.095	0.047	0.18	0.006
	Chloride of sodium	....	....	....	....	....	....	....	....	....	....	....	....
Insoluble in dilute hydrochloric acid.	Silicic acid	82.488	85.997	87.461	80.280	79.704	81.988	81.520	81.535	82.908	80.200	83.52	85.810
	Sesquioxide of iron	0.157	1.739	0.324	1.560	1.379	0.988	1.400	8.045	0.763	1.150	0.56	0.490
	Sesquiox. of manganese	0.110	trace	0.006	....	....	trace	....		trace	0.240	....	....
	Alumina	0.978	3.319	4.380	6.280	6.481	6.692	6.680	....	6.145	3.250	1.67	1.403
	Lime	0.330	0.447	0.192	6.480	0.689	1.305	0.360	0.363	1.201	0.250	0.48	0.222
	Magnesia	6.987	0.361	0.108	0.520	0.536	0.415	0.240	0.155	0.473	0.160	1.10	....
	Potassa	0.792	1.104	0.666	1.440	1.325	0.279	1.040	1.334	0.217	1.010	0.58	0.088
	Soda	0.598	0.083	0.787	0.880	0.883	0.023	0.320	0.358	0.018	1.217	0.87	0.276
Total		100.000	100.000	100.000	99.525	98.561	98.463	99.168	99.345	98.144	97.908	100.459	99.808

0.192NH^3 and 0.044NO_5.

*Humic acid. †Humin. ‡CuO.

*Annual report of the Progress of Chemistry and the Allied Sciences, by Justus Liebig and H. Kopp, vol. II, 1849, p. 463.

TABLE 23.—ANALYSES OF SOILS OF EUROPE.*

Number		9			10			11			12		
		Rose.	Kucke.	Krocker.	Rammelsberg.	Kueke	Krocker	Rammelsberg.	Heintz.	Debus.	Rammelsberg.	Krocker.	Knop.
		Soil of Burg-Wegeleben.			Soil of Frankenfelde.			Soil of Jurgaitschen.			Soil of Neuhof.		
Organic substance.	Carbon	2 360	0.013	2.850	0.750	....	0.759	1.03	2.92	3.010	0.48	1.534	1.713
	Nitrogen	0.432	....	0.272	0.079	2.640	0.093	0.24	0.55	0.280	0.13	0.154	0.011
	Hydrogen	5.128	13.587	5.328	1.450		1.240	5.44	0.43 / 3.04	3.216	3.76	2.631	0.312 / 2.604
	Oxygen												
	Sulphur	....	0.180	0.030	....	....	....	....	...	....	....	....	....
Soluble in dilute hydrochloric acid.	Chlorine	trace	....	0.009	trace	....	0.010	trace	...	0.010	0.003	0.015	trace
	Carbonic acid	2.410	1.170	1.955	....	....	....	0.08	...	0.106	0.040	0.066	0.016
	Sulphuric acid	2.080	0.423	1.127	0.016	....	0.015	0.004	0.097	0.068	0.007	0.016	0.036
	Phosphoric acid	trace	1.028	0.009	0.004	0.418	0.071	0.026	0.54	0.230	0.090	0.029	trace
	Silicic acid	....	....	0.201	....	....	0.180	...	....	0.203	....	0.856	
	Sesquioxide of iron		1.460	1.058	0.696		0.902	0.90	0.53	1.290	1.370	1.167	
	Sesquiox. of manganese	6.710	....	1.775*	....	0.565	....	....	....	....		*1.165	
	Alumina		4.285	4.476	0.555	0.691	1.497	0.46	0.93	1.244	0.64	1.170	4.070
	Lime	3.590	3.049	4.095	0.063	0.107	0.101	0.36	1.17	0.345	0.42	0.409	
	Magnesia	0.160	0.388	0.745	0.116	0.068	0.145	0.09	0.75	0.233	0.15	0.349	
	Potassa	0.530	0.198	0.324	trace	....	0.052	0.06	0.42	0.257	0.08	0.174	
	Soda	0.060	0.060	0.029		....	0.043		0.66	0.060	....	0.010	
	Chloride of sodium	....	....	....	....	....	....	....	....	....	....	....	
Insoluble in dilute hydrochloric acid.	Silicic acid	66.490	63.564	68.218	89.910	84.120	87.772	81.42	82.79	79.280	83.69	84.699	
	Sesquioxide of iron	0.680	5.443	0.671	1.314	2.921	0.572	1.39	0.72	....	1.34	0.641	
	Sesquiox. of manganese	....		....	....		....	....	....	0.190	....	....	
	Alumina	6.100	7.949	1.313	1.545	6.620	3.338	3.21	1.37	5.370	3.28	4.069	89.960
	Lime	0.530	2.765	3.676	0.857	0.974	0.360	1.27	0.53	0.500	0.83	0.234	
	Magnesia	0.500	0.950	0.117	1.764	0.584	0.174	1.49	0.56	0.210	1.19	....	
	Potassa	1.250	....	1.543	1.155	....	1.404	1.92	0.97	1.230	1.78	0.841	
	Soda	1.310	....	0.045	0.520	....	0.584	0.61	0.77	0.500	0.72	0.727	
Total		100.320	106.461	99.984	100.794	99.708	99.312	100.000	99.547	97.832	100.000	100.958	97.770

*FeO. †NH3.

*Annual report of the Progress of Chemistry and Allied Sciences, by J. Liebig and H. Kopp, vol. 3, 1849, p. 462.

TABLE 2ᵈ.—ANALYSES OF SOILS OF EUROPE.*

Number		13			14			15	16	17	18	19	20	21	22
		Bergemann.	Sonnenschein.	Erdmann	Bergemann.	Sonnenschein.	Bothe	Meyer and Brazier.				Schmid.			
		Soil of Havixbec.			Soil of Dalheim.			Flax Soil of: Liefland.	Kurland.	Lithuania.	Esthland.	Russian Black Earth.			
Organic substance.	Carbon	2.065	0.943	1.130	1.743	1.610	0.834	4.717	4.030	4.344	4.863	12.65	8.58	5.92	8.98
	Nitrogen	0.591	0.081	0.400	1.609	0.150	trace								
	Hydrogen	1.086	0.183	0.243	1.260	0.350	0.394								
	Oxygen		0.586	0.667		....	2.951								
	Sulphur	....	....	....	....	0.725	....	....	....	....	....	....	....	....	....
Soluble in dilute hydrochloric acid.	Chlorine		0.007	trace	1.418	0.012	trace	....	....	....	....	....	....	....	....
	Carbonic acid	0.470	0.340	0.411	....	0.250	....	....	....	....	....	1.03	0.58	0.25	1.18
	Sulphuric acid	1.615	0.012	0.043	....	0.053	0.031	0.154	0.088	0.121	0.162	....	....	....	....
	Phosphoric acid	....	....	0.229	0.456	....	0.651	0.140	0.054	0.080	0.160	0.06	....	....	0.10
	Silicic acid	....	....	....	1.338	....	....	....	....	....	....	....	....	....	....
	Sesquioxide of iron	0.663	1.143	0.881	1.593	2.590	1.826	1.807	2.377	3.190	2.021	2.36	2.13	2.77	2.85
	Sesquiox. of manganese	....		trace	0.224	0.009	trace	trace	trace	trace	trace	0.13	0.03	0.01	....
	Alumina	0.804	2.024	0.929	4.056	3.570	2.358	1.192	1.873	2.142	2.010	1.12	2.18	1.69	1.22
	Lime	1.454	0.721	0.929	0.691	0.270	0.393	0.375	0.782	0.498	0.795	0.69	0.45	0.23	0.80
	Magnesia	....	0.136	0.216	0.277	0.250	0.748	0.201	0.130	0.180	0.362	0.45	0.02	0.16	0.52
	Potassa	....	0.209	trace	0.181	0.440	trace	0.501	0.324	0.547	0.373	0.19	0.25	0.39	0.23
	Soda	....	0.102	0.653		0.270	1.400	....	0.132	0.045	0.048	0.07	0.10	0.11	0.09
	Chloride of sodium	....	....	....	....	....	....	0.045	0.025	0.042	0.079	....	....	....	....
Insoluble in dilute hydrochloric acid.	Silicic acid	78.273	88.299	86.403	75.332	84.270	75.750	79.342	81.500	85.094	80.568				
	Sesquioxide of iron	1.038	0.655	1.930	2.671	trace	1.294	trace	trace	trace	trace				
	Sesquiox. of manganese	....		trace	....		trace	....	....	....	....				
	Alumina	9.434	3.511	0.265	6.917	4.530	7.738	11.627	6.114	2.245	5.755	81.94	86.05	89.16	84.31
	Lime	2.163	....	2.325	0.370	....	0.507	trace	1.873	0.878	2.012				
	Magnesia	0.364	....	?	....	....	0.369	....	....	....	....				
	Potassa	trace	1.085	0.810	....	0.500	2.898	....	....	....	....				
	Soda		....	trace	....	....	trace	....	....	....	....				
Total		100.020	100.037	98.464	100.136	99.876	99.142	100.101*	99.302*	99.406	99.208*	100.24	100.39	100.60	100.28

*Traces of Phosphoric acid.

*Annual report of the Progress of Chemistry and the Allied Sciences, by J. Liebig and H. Kopp, vol 3, 1849, p 465.

TABLE 25.—Composition of the soils of Massachusetts, according to Prof. Hitchcock. Geology of Massachusetts, by Edward Hitchcock, L. L. D., vol. 1, pp. 41, 43.

NAME AND LOCALITY OF THE SOIL.	Phosphate of Lime.....	Sulphate of Lime.....	Carbonate of Lime.....	Soluble Gehie.....	Insoluble Gehie.....	Silicates.....	100 Gr. heated to 300 F., absorbed in 24 hours.	Absorbing power in proportional numbers.....	Specific Gravity.....
Alluvium, Deerfield	0.9	2.0		3.5	1.2	92.4	3.3	65.	2.44
do Northampton	1.0	2.4		2.8	4.2	89.6	2.0	40.	2.45
do Deerfield	0.9	1.6		2.3	1.1	94.1	2.1	42.	2.58
do Northampton	1.1	0.9		1.2	2.4	94 4	1.2	25.	2·68
do Northfield	0.6	1.5		2.8	2.8	92.3	2.9	58.	2.55
do Northampton	0.8	2.8		2.4	0.8	93.2	1.4	28.	2.55
do W. Springfield	0.7	1.3		3.2	1.2	93.6	3.0	60.	2.46
do Westfield	1.0	2.6	6.2	2.4	2.7	85.1			2.38
do do	0.3	0.9		1.5	1.2	96.1			
do Stockbridge	0.5	2.9		3.3	0.8	92.5	1.9	48.	2.55
do Hadley	1.0	2.7		2.5	2.8	91.5	5.0	100.	2.46
do Sheffield	0.5	1.7		1.3	5.2	91.3	3.5	70.	2.53
do Deerfield	0.8	0.8		2.5	2.4	93.5	2.0	40.	2.58
do W. Springfield	0.5	1.0		1.5	1.5	95.5	1.5	30.	2.60
Diluvial Argillaceous, Springfield	1.2	2.4		4.8	5.8	85.8	6.3	126.	2.31
do do Northampton	0.8	1.6		4.8	4.6	88.2	6.1	122.	2.37
do do Plymouth	0.9	1·8		2.9	4.9	89.5	4.9	98.	2.34
do do Barnstable	0.6	0.9		4.4	5.9	88.2	4.9	98.	2.39
do do Sandwich	1.1	3.0		2.8	4.9	88.2	4 2	84.	2.37
dc Sandy Warcham	0.4	0.4		0.5	0.0	98.7	0.5	10.	2.37
do do Springfield	0.6	1.6		3.2	0·0	94.6	1.7	34.	2.60
do do Northampton	0.5	0.5		3.6	4.4	91.0			
do Loamy, Amherst	0.9	2.5		3.5	2.3	90.8			2.37
do Sandy, Sheffield	0.08	3.2		0.0	0.8	98.8			2.66
do do Truro	0.35		20.3	3.7	1.6	73.1	1.7	34.	
do do Barnstable	0.3	0.1		0.0	0.0	99.6	0.8	16.	2.72
do do Gloucester						100.	0.7	14.	2.71
Sandstone, (Red) Deerfield	0.7	0.8		0.3	2.6	95.6	3.4	68.	2.53
do do Longmeadow	0.6	3.2		3.2	0.5	92 5	3.2	64.	2.43
do do Wilbraham	0.8	1.0		6.1	1.2	90.1	2.5	50.	2.60
do do W. Springfield	0 7	4.2		4.1	4.2	88.1	2.7	54.	2.46
do (Gray) Granbury	0.8	0.6		2.7	1.1	94.1	3·0	60.	2.51
Graywacke Soil, Dorchester	1.0	1.8		7.6	2.4	97.5	4.5	90.	2.37
do Roxbury	1.4	2.3		4.4	2.8	88.1	3.9	78.	2.43
do Brookline	1.4	3.1		6.0	0.8	84.2	5.8	116.	2.34
do Walpole	0.8	1.9		2·6	1.2	89.2	3.1	62.	2.31
do Dighton	0.5	1.9		2.1	2.7	92.1	1.5	30.	2.34
do Middleborough	0.9	2.1		1.2	1.2	92.1	1.6	32.	2.48
do Quincy	1.5	2.4		2.1	0.8	90.0	3.5	70.	2.44
do W. Bridgewater	0.6	1.2		3.4	2.3	92.6	2.5	50.	2.40
do Watertown	1.1	1.9	1.3	5.6	5.2	94.6	4.6	92.	2.27
do Halifax	0.8	0.3		3.3	2.4	92.9	1.0	20.	2.45
do Cambridge	0.2	1.8		2.8	1.5	91.7	2.6	52.	2.45
do Taunton	0.8	1.8		4.7	5.8	90.3	1.8	36.	2.44
do Attleborough, east part	0.6	0.5		2.0	4.6	92.8	2.8	56.	2.48
do do West part	2.0	1.9		2.5	4.9	87·0	3.7	72.	2.21
Argillaceous Slate, Lancaster	0.9	4.6		5.0	5.9	85.0	5.6	112.	2.25
do do Sterling	0.5	1.8		6.1	4.9	87.0	2.6	52.	2.32
do do Townsend	1.0	1.0		6.2	0.0	86.8	3.5	70.	2.31
Argillaceous Slate Soil, Lancaster	1.0	2.0		7.9	0.0	85.2			
do do do Boston	1.0	2.5	3.0	4.0	4.4	82.2			2.35
Limestone, (Magnesian) Marlborough	2.0	1.4		4.4	2.3	91.7	3.0	60.	2.43
do Lanesborough	4.2	1.1		3.0	0.8	90.9	3.6	72.	2.39
do Great Barrington	6.0	1.7		3.6	1.6	89.2	3.5	70.	2.56
do Adams	3.3	1.5		2.2	0.0	92.6	2.8	56.	2.46
Limestone Soil, Saddle Mt. Adams	0.6	0r1	1.5	0.7	3.3	93.8			2.58
do do Richmond	0.8	0.8	0 8	2.6	2.1	92.9			2.39
do do South Lee	0.7	0.6		2.1	2.3	94.3			
do do Egremont	0.7	1.8		1.4	1.5	94.6			2.46
do do Williamstown	0.6	2.8		3.1	2.0	91.5	5.5	110.	2.39
do do Stockbridge	0.7	3.9		2.3	5.2	87.9	6.0	120.	2.45
do do Pitsfield	0.7	1.0		5.4	5.3	97.6	3.0	60.	2.39
do do Sheffield	0.5	1.8	0.8	2.7	4.2	90.0	5.1	102.	2.27
do do W. Stockbridge	1.6	1.0	3.2	4.0	5.2	85.0	4.5	90.	2.39
Mica Slate Soil, West Boylston	0.6	0.9		6.0	5.1	87.4	4.2	84.	2.31
do do do Webster	1.0	1.3		5.5	3.1	99.1	5.5	110.	2.31
do do do Lunenburg	1.1	0.8		5.0	3.4	89.7	4.3	86.	2.29
do do do Stockbridge	1.5	0.2		3.0	5.5	89.8	5.3	106.	2.40
Mica Slate Soil, Chester Village	1.5	1.5		6.0	3.5	87.5	4.7	64.	2.41
do do do Bradford	1.2	2.0		6.5	6.2	83.5	6.5	130.	2.26
do do do West Newbury	1.0	3.5		3.0	5.5	87.0	4.8	96.	2.37
do do do Methuln	0.6	1.5		2.9	2.2	92.8	0.9	18.	2.58
do do do Pepperell	0.7	1.6		3.8	7.0	86.9	6.2	124.	2.27

TABLE 25.—SOILS OF MASSACHUSETTS—CONTINUED.

NAME AND LOCALITY OF THE SOIL.	Phosphate of Lime.	Sulphate of Lime.	Carbonate of Lime.	Soluble Gelne.	Insoluble Gelne.	Silicates.	100 Gr. heated to 300 F. absorbed in 24 hours.	Absorbing power in proportional numbers.	Specific Gravity.
do do do Norwich,	0.6	1.2		4.1	4.3	89.8	5.3	106.	2.36
do do do Conway,	1.1	1.7		2.0	4.5	90.7	3.2	64.	2.53
do do do Russell,	0.5	2.7		3.8	6.0	87.0			
do do do West Newbury,	0.9	3.0		5.9	5.7	85.5			
Talcose Slate Soil, Chester,	1.0	3.1		1.5	2.1	92.3	3.1	62.	2.54
do Charlemont,	0.6	3.7		3.8	2.2	92.0	3.5	70.	2.45
do Becket,	1.1	1.4		8.5	2.2	82.0			
do Rowe,	1.6	2.5		4.1	4.6	87.2			2.35
do Mount Washington,	1.5	1.7	2.0	2.6	4.7	87.5			2.33
Talco-Mieaceous Slate, Florida,	2.0	2.4		3.2	8.4	84.0	5.8	116.	2.35
do Haneock,	1·0	1.5		6.2	5.8	85.5	2.3	46.	2.31
Gneiss Soil, Tewksbury,	0.8	1.2		4.3	3.9	89.8	3.5	70.	2.41
do Stow,	1.0	2.0		4.0	3.0	90.0	3.8	76.	2.41
do Bolton,	0.9	2.1		4.6	3.4	89.0	3.8	76.	2.40
do Uxbridge,	0.9	2.9		2.6	3.0	90.6	3.5	62.	2.36
do Mendon,	0.7	2.4		2.6	2.5	91.8	3.4	68.	2.51
do Tyngsborough,	0.6	0.6		4.5	1.8	92.5	2.6	52.	2.45
do Holden,	1.4	1.4		3.9	4.7	88.6	5.0	100.	2.37
do Dudley,	0.7	1.9		4.0	4.6	88.8	5.3	106.	2.35
do Templeton,	0.5	2·7		5.2	4.1	89.5	5.1	102.	2.26
do Rutland,	1.2	1.9		7.1	5.3	84.5	6.5	130.	2.27
do Westminster,	0.7	2.2	3.0	5.3	3.8	85.0	4.6	92.	2.26
do Royalston,	0.6	1.9		6.0	3.6	87.9	5.4	108.	2.27
do Fitchburg,	0.7	1.0	2.1	5.4	3.3	87.5	3.4	68.	2.44
do Petersham,	0.4	2.4		5.7	4.8	86.7	4.5	90.	2.36
do New Braintree,	0.8	1.7		6.0	6.3	85.2	6.7	134.	2.34
do Palmer,	0.6	2.1		5.7	2.7	88.8	2.6	52.	2.49
do Enfield,	1.0	2.5		7.2	4.9	84.4	6.4	124.	2.29
do New Salem,	0.7	1.5		3.2	2.7	91.9	3.7	74.	2.44
do Leverett,	0.7	2.8		3.3	3.7	89.5	4.4	88.	2.49
do Hardwick,	0.6	2.1		6.3	3.3	87.7	4.9	98.	2.36
do Ware,	0.6	1.9		5.3	0.7	91.5	2.3	46.	2.68
do Grafton,	0.6	2.1		4.5	3.5	89.3	5.4	108.	2.39
do Bumfield,	0.4	1.0		5.3	2.1	91.2	3.7	74.	2.46
do Leicester,	1.3	2.8		3.9	2.9	89.1	5.2	104.	2.48
do Otis,	1.1	1.8		4.7	5.4	87.0	6.0	230.	2.34
do Becket,	1.1	2.9		8.3	2.4	85.3	6.0	120.	2.27
do Sandesfield,	1.5	2.5	2.8	3.2	3.3	86.7			2.32
do Tolland,	1.0	3.9		5.2	3.8	86.1			2.28
do Northfield,	1.0	1.5		1.3	3.0	93.2			2.24
do Buckland,	0.7	2.1		5.4	2.0	89.8	2.8	56.	2.51
do Wareham,	0.4	1.2		2.0	0.6	95.8	0.9	18.	2.68
do Stonbridge,	0.4	2.3		5.1	3.7	88.5	2.7	54.	2.50
do Bramfield,	0.5	1.1		0.6	3.8	94.0	3.7	74.	2.60
do West Brookfield,	0.5	1.6		1.5	5.1	91.3	4.7	94.	2.68
do Oakham,	0.3	1.4		4.8	2.2	91.3	3.0	60.	2 55
do Athol, decomposing Greiss,	0.3	2.7		0.3	5.3	92.1	3.0	60.	2.60
Granite Soil, West Hampton,	0.8	1.6		1.2	4.0	92.4	2.2	44.	2.60
do Concord,	0.5	1.6		7.1	2.0	88.8	2.5	50.	2.50
do Duxbury,	0.7	0.8		4.0	2.0	92.5	2.4	48.	2.43
do Andover,	0.6	1.6		5.1	7.5	85.2	4.4	88.	2.29
Sienite Soil, Lynnfield,	0.6	1.4		5.1	5.2	87.7	4.4	88.	2.29
do Marblehead,	0.6	2·7		5.1	5.0	86.6	5.8	116.	2.35
do Manchester,	0.6	0.8		6.5	3.4	88.7	4.0	80.	2.49
do Glouchester,	0.3	1.5		2.4	2.2	93.6	2.8	56.	2.25
do Lexington,	0.6	2.6		5.4	3.9	87.5	6.5	130.	2.24
do Danvers,	0.7	2.7		3.8	6.9	85.9	5.0	100.	2.34
do Newbury,	0.5	1.0		5.0	5.5	88.0	5.3	106.	2.36
do Dedham,	1.3	1.0		7.0	4.7	86.0	6.2	124.	2.24
do Wrentham,	1.5	0.8	0.4	5.6	5.6	86.1	3.6	72.	2.42
do New Bridgewater,	0.7	2.5		2.2	5.9	88.7	3.7	74.	2.36
do Weymouth,	0.7	2.2		2.6	5.1	89.5	4.0	80.	2.25
do Sharon,	0.5	1.7		6.9	3.2	87.7	3.2	64.	2.35
do Mansfield,	0.8	1.1		1.9	2.9	93.6	3.7	74.	2.42
do Abington,	0.8	1.5		2.7	3.7	91.3	2.7	54.	2.46
Porphry Soil, Kents Islard,	0.4	3.3		5.7	4.6	86.0	6.3	126.	2.26
do Medford,	0.8	2.6		8.7	4.2	83.7	6.6	132.	2.17
Porphry Soil, Malden,	1.6	3.5		5.3	4.1	85.6	6.8	136.	2.26
do Lynn,	0.6	1.8		4.3	3.5	89.8	5.9	118.	2.29
Greenstone Soil, Ipswich,	0.2	0·7		2.8	9.4	85.9	3.6	72.	2.32
do Woburn,	1.2	1.3		7·7	4.6	85.2	6.0	120.	2.27
do Deerfield,	0.3	0.1	2.0	3.2	4.3	90.1	2.7	54.	2.51
do Belchertown,	1.0	2.4		2.3	4.6	89.7			2.53
SOILS OF ILLINOIS AND OHIO.									
Rushville, Illinois,	0.6	3.4	1.5	7.4	2.5	84.6	6.3		
Sangamon County, Illinois,	0.4	1.2	1.3	4.9	5.6	86.6	6.3		
Lazelle County, do.	0.4	1.4	3.3	7.6	13.8	73.5	9.5		
Peoria do do.	1.0	3.5		3.1	4.8	87.6	5.7		
Scioto Valtey, Ohio,	0.9	2.1	2.8	4.5	6.7	83.0	5.3		

TABLE 26—COMPOSITION OF THE SOILS OF NEW YORK, ACCORDING TO PROFESSOR E. EMMONS,

Natural History of New York, Part 5, Agriculture, vol. i, Albany, 1846, pp. 238-346.

NAME AND LOCALITY OF SOIL.	Water as moisture	Organic matter	Silex	Peroxide of iron and alumina	Carbonate of Lime	Magnesia	Carbonate of Magnesia	Carbonate of Potash	Phosphate of Lime	Chlorine	Sulphate of Lime	Phosphoric Acid	Peroxide of Iron	Alumina	Phosphate of Alumina	Manganese	Potash
HIGALAND DISTRICT.—Granitic Soil, Elizabethtown,	2.00	1.00	94.00	2.50	0.50	trace			trace								
" " " " Lewis county	4.00	3.25	85.25	5.00	1.00	0.12			trace								
" " " " " "	1.00	2.50	94.00	2.00	0.25	0.00			trace								
" " " " " " "	3.00	2.00	92.00	2.50	0.50	trace			trace								
" " Argillaceous Soil, Tertiary Clay,	5.00	4.20	80.00	8.25	2.40	0.10			trace								
" " Tertiary Clay, Lake Champlain,	2.249	1.24	60.16	7.79	0.94		0.60	0.11	trace	trace	none						
SOUTHERN HIGHLAND DISTRICT.—Granite Soil,	2.79	7.65	75.83	12.00	1.15	0-68			trace								
" " " " " Sub-soil	1.76	4.12	80.79	12.00	0.85	0.60			trace								
" " " " " " "	1.13	3.00	81.67	12.21	0.83	1.16			trace								
TACONIC DISTRICT.—Soil of Petersburgh,	4.50	4.00	81.78		0.75	0.50					0.15	0.02	4.00	3.70			
" " " " Chatham,	3.50	8.50	76.00		0.75	0.50						1.02	7.10	3.50			
" " " " "	4.10	6.25	78.75		0.75	0.75							4.45	4.85			
" " " " Hoosic Corners,	4.25	12.69	69.78		1.76	1.30							5.55	3.42	1.15		
" " " " Hoosic-falls,	2.00	7.12	78.77	8.81	1.00	1.02			0.12								
" " " " " "	3.00	5.50	78.20	10.52	1.52	0.33								4.20			
" " " " East Salem,	3.50	6.00	79.00	5.75	0.87	0.75							2.75	4.50			
" " " " Schodack,	4.25	6.75	79.75		0.50												
" " " " Roofing Slate,	0.50	2.20	80.72	12.76	1.76	0.40											
" " " " Welch Slate,	0.34	2 30	78.76	16.64	1.36	0.52											
" " " " Fitch's Point, Salem,	1.00	2.50	87.00		1.00								5.20	3.05		0.25	
" " " " " "	3·50	9.25	77.50	7.12	0.10	0.50			0.06								
" " " in Washington county.	7.18	6.12	79.72	6.12	0.10	0.50			0.60								
" " " " Western part of Schodack,	3.50	6.00	79.75		trace	0.75							5.75	4.25			
" " " " Schodack,	2.07	6.05	85.05		trace	trace							4.87	1.75			
" " " " W. slope of Petersburgh mountain,	2.00	2.75	85.00	6.75	3.00	0.50											
" " " " Surface Soil of Peekskill,	2.10	3.70	87.50	6.60	0.30	trace											
" " " " Caldwell,	0.94	2.34	83 84	10.01	3.00	trace											
" " " Brick Clay, Caldwell,	1.16	5.52	65.60	13.52	8.92	trace											

TABLE 26—COMPOSITION OF THE SOILS OF NEW YORK.—CONTINUED.

NAME AND LOCALITY OF SOIL.	Water as moisture	Organic matter	Silex	Peroxide of Iron and Alumina	Carbonate of Lime	Magnesia	Carbonate of Magnesia	Carbonate of Potash	Phosphate of Lime	Chlorine	Sulphate of Lime	Phosphoric Acid	Peroxide of Iron	Alumina	Phosphate of Alumina	Magnesia	Potash
HUDSON & MOHAWK DISTRICT—Limestone, clay, slate, drift, and granitic soils,																	
" " " Soil of DeGroff's flats,	4.50	7.37	78.83	6.50	2.00	.40				.03							
" " " " " Fonda,	3.25	4.20	84.40		.75	.65							4.11	2.63			.14
" " " " " Tribe's Hill,	4.00	10.50	84.30	6.40	2.08	.40					1.20						
" " " " " Amsterdam,	4.50	4.75	79.50	8.40	1.09	.40											
" " " " " Little Falls,	4.00	12.00	71.73	10.25	1.50	.50			.07								
" " " " " Rome,	4.00	8.00	76.00	8.30	8.10	.12											
" " " " " "	3.75	4.25	84.00	5.50	2.50	.15											
" " " " " "	5.25	9.00	74.80	5.64	5.24												
" " " " " "	4.25	6.00	80.50	4.94	4.24	trace											
" " " Hudson River Valleys,	4.50	5.52	82.88	6.04	.50	.25											
" " " Albany Clay,	4.25	1.17	69.02	17.24	4.00	3.00					1.00						
" " " " "	9.75		71.92	14.93	1.75	.70											
" " " Albany Clay Stones,	6.28	1.70	30.88	9.42	50.98	.22											
WESTERN OR WHEAT DISTRICT.—Soil of Red Shale near Canastota,	1.50	2.50	85.00	8.12	2.11	.12									.50		
" " " Soil of Green Shales,	10.82	1.30	71.05	9.74	4.00	1.50					.40				.12		
" " " " " "	5.25	6.67	77.50	7.75	1.25	1.10					.22						
" " " " " "	4.79	5.24	78.25	8.25	1.15	1.20					.20						
" " " Green Lakes in Manlius,	4.00	6.25	77.00	9.74	3.00	.50											
" " " " " "	4.00	8.50	79.54	6.49	1.41	trace											
" " " Clay Sub-soil, Cayuga Lake,		14.36	48.12	24.00	12.00	1.00											
" " " Soil Great Fields,	4.40	10.24	73.12	12.00	.40	.12											
" " " " " "	2.92	6.80	86.94	1.22	.80	.10											
" " " " near Cayuga Lake,	2.17	5.03	83.09	8.00	1.50	.15											
" " " Sub-soil " " "	3.00	2.87	32.00	8.20	3.00	.30											
" " " Surface soil " " "	3.16	7.44	74.00	8.30	6.48	.50					.12						
" " " Sub-soil,	4.15	3.75	80.00	10.00	1.50	.35											
" " " Marcellus Shales of Hamilton Group,	2.00		50.00	10.00	36.90	1.00											
" " " Soil resting on Marcellus Shales,	2.00	6.00	81.50	8.00	2.25	.25											
" " " " " " "	4.15	5.06	80.15	3.00	.50	7.0											
" " " " " " "	5.20	6.50	89.05	7.64	2.05	.25											
" " " " " " "	3.00	5.15	78.00	13.00	1.09	trace											
" " " Sub-soil resting on Pentamerus Limestone,	1.48	2.30	85.90	8.57	.21	.05											
" " " Sub-soil " " " "	2.81	4.59	34.64	7.26	.50	.18											

NAME AND LOCALITY OF SOIL.	Water as moisture	Organic Matter	Silex	Peroxide of Iron and Alumina	Carbonate of Lime	Magnesia	Carbonate of Magnesia	Carbonate of Potash	Phosphate of Lime	Chlorine	Sulphate of Lime	Phosphoric Acid	Peroxide of Iron	Alumina	Phosphate of Alumina	Magnesia	Potash
WESTERN OR WHEAT DISTRICT.—Soil of Onondaga Limestone	.50	4.85	85.50	7.92	.62	trace											
" " " Shales of Onondaga Salt Group	4.75	6.20	75.62	10.39	.50	2.15											
" " " Soil " " " "	4.00	6.50	78.82	4.69	3.71	1.75									.24		
" " " " " " "	3.84	10.44	77.78	4.98	1.50	1.48											
" " " " " " resting upon rotten Shale	5.10	5.94	80.40	5.00	2.36	1.08											
" " " " Wheatland, Monroe county	5.70	5.92	80.18	6.40	.40		.28		.12								
" " " " Lockport, Niagara county	3.00	5.00	85.72	5.00	1.00	trace									.04		
" " " " " " "	3.00	7.75	76.92	8.82	2.82	.25									.15		
" " " " " " " "	3.61	9.24	70.88	13.50	.34	.04											
" " " Soil reposing upon thin band of limestone at base of Genesee Slate	2.81	5.19	76.50	12.38	1.62	.50											
" " " Surface Soil resting on Genesee Slate	4.04	1.61	81.70	7.50	1.75	.50											
" " " Soil resting on Moscow Shale	2.00	1.12	89.75	4.21	2.18	trace											
" " " " " " "	2.50	8.25	81.50	5.90	.50	.05											
" " " Wheat Soil, Niagara county	3.00	7.75	76.93	8.82	2.82	.25									.15		
" " " Soil " " "	1.75	2.25	88.53	4.80	.70	trace											
" " " Washed Sand	1.00	1.00	84.75	3.32	8.04	1.47											
" " " Kempville	2.00	2.50	87.75	4.32	.25	.01											
" " " Sandy Soil, Albion	1.50	1.70	92.82	1.49	2.00										.17		
" " " Soil Genesee flats	12.25		74.65	8.75	2.43	1.00											
SOUTHERN DISTRICT.—Soil of Mount Toppin	3.68	6.84	81.32	7.62	.25		.15								trace		
" " " " Lafayette Square	4.68	5.25	82.32	6.62	.25	.12											
" " " near Ithaca	1.94	3.62	87.12	6.28	.60	.12											
" " " from Gainsville	7.60		81.26	10.80	.12	trace											
" " " of Green county	6.00		85.00	8.12	.75	.25											
" " " " Loon Lake	8.50		81.00	10.00	.15	trace											
" " " " Howard	9.50		80.50	9.25	.25	trace											
" " " E. slope Schoharie range	1.50		88.5		.06	trace							8.25	5.28			
" " " Old red Sandstone, Catskill	7.00	5.00	80.00	5.50	.25									3.50			
" " " " " " "	24.00		69.00		.75								2.17	3.07			
ATLANTIC DISTRICT.—Drift Soil, Long Island	6.00		87.87	6.25	.25	trace											
" " " " " " "	4.00	3.50	86.36	5.75	trace	trace											
" " " " " " "	5.00		87.06	3.75	.37	.13								4.00			

TABLE 27. SOILS OF RHODE ISLAND.

LOCALITIES.	REMARKS.	Water	Vegetable Matter	Soluble Mineral Matter	Insoluble Siliceous Matter	Oxide of Iron	Alumina	Iron and Alumina not separated	Salts of Lime	Magnesia	Mechanical Separation. 1st Sieve	2d Sieve	Fine Pow'd	
Barrington, A. Bicknell,	Crop last year, Potatoes,	3.	9.2	7.4	82.0			6.	1.4					
" Dr. I. Mauran,	Subsoil,	3.4	1.1	3.65	90.2			3.53	0.5	0.5	57.	100.	892.	
" " "	Crop last year, Potatoes without manure,	1.4	3.9	4.1	89 8			3 7	0.4		18.	200.	782.	
" " "	Crop, Corn last year,	1.6	6.4	6.6	85.1			5.9	0.7		97.	150.	733.	
" " "	Soil from Garden,	1.9	5.6	6.8	85.3			4.9	1.9		63.	15.	922.	
Christopher Smith,	Corn, said to be cold and liable to Moss,	3.	7.	3.15	86.1			2.4	0.3	0.45	126.	247.	627.	
Block Island, Jeremiah Clark,	Crop, Corn, soil light and sandy,	2.7	6.1	4.25	85.8			3.95	0.3		105.	95.	800.	
" " W. P. Sands,	Crop, Crass, one ton to the acre,	2.45	6.35	4.6	85.8			4.6	tr.		78.	158.	764.	
" " N. G. Sands,	Corn,	4.3	3.65	4.5	85 55			3.	1.5		100.	147.	763.	
Bristol, J. D. W. Perry,	Papooscsquaws Neck	2 5	6.1	5.8	85.6			5.3	0.2	0.3	181.	114.	705.	
" Mr. Gifford,	No. 1,	1.6	5.4	8.8	86.6			8.5	0.3		35.	87.	878.	
" " "	No. 2,	2.	7.2	8.3	92.0			7.6	0.5	0.2	43.	95.	852.	
" " "	No. 3,	1.8	9.5	8.6	78.9			7.1	1.5		35.	39.	936.	
" Mr. Bullock,	Orchard,	2.8	8.5	7.5	80.6	4.8	1.8		0.9		81.	138.	781.	
Centreville, Dr. Harris,	Flat Pond Meadow, subsoil,	2.	4.3	4.1	88.3			3.5	0.4	0.2			1000.	
Connanicut Island, N. E. Watson,	Twenty bushels Corn to the acre,	2.4	4.8	3.55	86.	1.75	3.2		1.	0.8	40.	86.	674.	
" " D. W. Clark,		1.2	3.4	3.4	91.1			3.35	0.5	tr.	3.	69.	928.	
Cranston, Christopher Rhodes,	"Sour High Intervale," sorrel abunpant,	3.9	8.0	3.95	84.1			3.3	0.8	0.35			1000.	
" " "	Corn field, sorrel abundant-	1.4	3.1	3.25	92.2			2.3	0.5	0.45	42.	132.	826.	
Centreville, Dr. Harris,	Clay,	2.6	2.6	7.4	85.4			6.9	0.5				1000.	
Johnson, Mr. Pettis,	Luxurlant Clover field,	3.3	9.5	8.6	78.8			7.9	0.7		30.	33.	937.	
Cumberland Hill, F. Brown,	Corn,	2.8	4.5	5.9	86.6			5.4	0.5		70.	73.	857.	
Cumberland, J. Whipple,	Forty bushels Corn and 40 bushels barley to the acre,	3.5	6.3	9.6	86.9	4.6	4.6		0.3	0.1	109.	188.	753.	
Cranston, George Knight,	Waterman's Mills, trace of Manganese found,	3.6	9.2	9.0	77.8	6.3	2.2		0.6		124.	140.	736.	
Cumberland, Mr. Lees.	Corn and Potatoes,	3.7	8.0	10.	77.3			8.4	1.6		218.	152.	630.	
Glocester Hill, W. Tourtellot,	Granite Dluvium	5.	12.4	6.2	76.0			6.2			26.	83.	881.	
Glocester Chepachet,	Sand Hill,	1.	1.5	4.	92.5			3.	0.9	0.1				
Great Neck, L. Clark,		4.	18.6	4.5	89.4			4.	0.5	tr.	10.	88.	902.	
Hopkinton,	Greyish White Sand,	0.8	0.9	2.6	95.1			2.6	tr.	tr.	128.	172.	700.	
Johnston, Mr. Pettis,	From side of the Road, uncultivated,	2.3	3.6	9.1	84.6	7.2	1.4		03.	0.2	51.	97.	952.	
" N. Brown,	Oats manured with Lime,	4.	4.3	9.0	75.3			7.8	09.	0.3	167.	135.	698.	
" " "	Oats not limed,	2.	7.4	5.7	85.2			4.9	08.		136.	116.	748.	
Little Compton, F. Palmer,	Corn manur'd in the hill with barn manure & pond mud	3.2	10.1	8.9	78.5	4.7	3.2		02.	0.1	186.	135.	679.	
" " Subsoil,	From forrest on road to Adamsville, color dark green,	1.5	2.2	5.8	89.			5.6	02.	0.1	296.	140.	664.	
" " "	From forrest of Oaks,	2.4	4.2	8.9	83.6	6.4	2.2		03.		165.	100.	735.	
" " Dr. Palmer,	Sorrel very abundant, manured with fish,	4.	9.	5.8	83.			5.3	tr.		104.	108.	788.	
New Providence, Widow Olney,	Louisquisset Turnpike,	2.9	7.7	6.	83.3			5.8	02.		50.	107.	843.	

TABLE 27. SOILS OF RHODE ISLAND—CONTINUED.

LOCATION.	REMARKS.	Water.	Vegetable Matter.	Soluble Mineral Matter.	Insoluble Siliceous Matter.	Oxide of Iron.	Alumina.	Iron and Alumina not separated.	Salts of Lime.	Magnesia.	Mechanical Separation. 1st Sieve	2d Sieve	Fine Pow'dr
Louisquisset Turnpike,	Chesnut growth, Magnesia and Manganese,	2.9	2.5	9.	84.2			4.2		4.8	60.	140.	800.
Mansville, Mr. Man,	Clayey Sand,	0.6	1.2	6.6	90.8			5.6	0.3	0.7	15.	20.	965.
Newport, Castle Hill Garden,		4.5	10.	8.8	75.3			7.8	1.0	tr.	140.	80.	780.
do N. S. Ruggles,		4.8	10.	6.4	73.9	4.4	7.1		1.8	0.7	230.	53.	717.
do Capt. Northam,	Four acre lot,	2.7	7.1	7.4	81.2			7.2	0.2		49.	66.	885.
do do do.	Pond lot,	4.5	8.9	3.92	77.4	2.92	5.13			1.	32.	37.	931.
do Judge Clark,	Wheat,	5.7	10.2	7.7	77.7	3.5	3.3		0.6	0.3	141.	223.	636.
N. Kingston, A. Browning,	Corn,	2.6	7.7	7.6	81.			7.1	0.4	0.1	15.	104.	881.
do E. Allen,	Dark brown swamp mud,	4.2	10.4	4.5	75.5			3.9	0.4	0.3	10.	59.	931.
oo H. Cole,	Oats,	2.4	4.7	5.3	87.3			5.0	0.3		47.	85.	978.
do Mr. Allen,	From Garden,	3.1	11.6	6.5	77.			6.1	0.4		3.	29.	968.
New Providence, A. Anthoney,	No. 1, in natural state, 10 bushels Corn to the acre,	1.7	4.1	4.2	88.2	2.10	2.1			tr.	14.	165.	821.
do do do.	No. 2, ashed, 1½ tons Clover, or 30 bush. Corn per acre,	1.6	3.45	5.07	88.2	2.	2.07		1.0		44.	161	795.
do do da.	No. 3, manur'd with stable manure & ashed, 60 bs. Corn,	1.5	4.05	3.39	89.1	2.07	1.32		tr.		38.	189.	773.
do dy L. Clark,	Clay,												
Portsmouth, Gov. Child,	Wheat, fish manure, last year,	2.8	6.2	6.5	83.4			5.2	0.8	0.5	80.	155.	765.
do do do.	Wheat,	3.4	10.5	8.1	77.1			7.5	0.6		174.	120.	706.
do do do.	Corn large, no manure this yr. below a man'd onion bed	3.3	6.2	8.5	80.4			7.1	1.4		144.	158.	698.
New Providence, A. Anthoney,	Potatoes,	2.9	5.4	7.4	85.4	3.4	0.7		0.8	2.5	32.	152.	816.
do do do.	Potatoes,	3.1	10.8	4.2	81.7			3.3	0.8		15.	103.	882.
Seekonk Tristame Burges,	Rye, luxuriant,	1.8	6.9	7.3	83.7			5.8	1.5		45.	152.	803.
do Dr. Gardner,	Corn, barn yard manure, 10 loads per acre,	1.6	8.1	9.5	80.5	5.1	2.5		1.9		9.	52.	939.
do do do.	Oats,	2.0	6.4	6.2	87.			5.5	0.7		10.	85.	905.
do do do.	Top Soil,	4.8	12.	6.63	76.			6.6	0.05		58.	220.	712.
Smithfield,	Forest oaks and chesnuts,	3.7	5.6	10.1	80.	6.5	3.2		0.4		67.	190.	843.
do	Soil from decomposed horn blende rock, Harris quar.,												
do Arnold,	Soil from decomposition of Limestone,												
South Kington, Point Judith,	Subsoil, Corn,												
Smithfield,	Clay,												
Scituate, B. C. Hopkins,	Near Hard Rock,	5.6	13.9	13.8	65.6			12.4	1.2	0.2			
Smithfield, T. Smith,	Barley,	2.0	6.7	5.6	86.1	1.9	3.		0.8		100.	114.	786.
do Mr. Ballou,	Oak,	1.7	6.8	7.2	83.7			6.4	0.7		56.	129.	825.
do do do.	Corn, subsoil,	3.4	7.8	9.1	80.3	6.1	2.3		0.2	0.5	120.	108.	772.
do do do.	Corn,	4.9	12.1	7.8	76.	4.4	3.		0.4		135.	136.	729.
do do Harris,	Barley, (some Manganese),	3.2	7.1	6.3	81.8			4.8	0.5	1.0	151.	179.	674.
do do do.	Hornblende soil, Corn,	5.5	3.8	12.8	67.	8.6	0.3		tr.	3.9	140.	100.	760.
do A. Arnold,	Corn, subsoil,	2.3	6.0	6.7	83.8			5.5	0.2	0.9	26.	46.	928.

TABLE 27. SOILS OF RHODE ISLAND—CONTINUED.

LOCATION.	REMARKS.	Water,....	Vegetable Matter,....	Soluble Mineral Matter,....	Insoluble Siliceous Matter,....	Oxide of Iron,....	Alumina,....	Iron and Alumina not separated,....	Salts of Lime,....	Magnesia,....	Mechanical Separatlou. 2d Sieve	1st Sieve	Fine Powdr
South Kingston Hill,....	Corn,....	3.9	10.8	6.0	78.6			5.6	0.4	tr.	146.	106.	758.
do do South Ferry,....	Pasture,....	2.0	7.6	3.1	86.			2.8	tr.	0.3	15.	58.	727.
do do Plain,....	Good Corn,....	3.4	9.0	6.5	80.6			6.3	0.2		69.	55.	870.
do do L. Clrrk,....	Decomposed Granite,....	1.3	2.0	4.9	92.1			3.5	0.8	0.6			
do do J. D. Clark,....	Barley,....	4.5	12.8	3.3	79.1			3.0	0.3		57.	190.	75.
do Gov. Arnold,....	Potatoes not manured,....	2.9	11.	5.2	80.6			4.7	0.5		63.	94.	84.
Tiverton, Judge Durfee,....	....	2.5	7.9	8.8	79.7			8.1	0.7		250.	139.	61.
do do do	Oat field,....	3.9	8.75	8.35	76.5			7.6	0.3	0.45	210.	96.	69.
do do do	Wheat,....	4.2	8.2	7.55	78.6			7.3	0.25		204.	116.	68.
Warwick Neck,....	Capt. Holden,....	1.9	7.4	5.2	85.2			5.0	0.2		147.	100.	75.
Woonsocket,....	Mica Slate mixed with vegetable matter,....	2.2	4.5	12.	81.3			11.	1.0	tr.			
"	Sea weed manure, Corn,....												
" Mr. Hotchkiss,....	Corn,....	1.2	7.4	4.4	90.4	3.5	9.5		0.4		100.	140.	76.
Warwick, Gov. Francis,....	Oak forest, large Pine growth,....	4.	10.	6.45	78.			6.35	0.1	tr.	78.	104.	818.
Warren Neck, Samuel Mason,....	Sand,....	3.8	8.6	7.7	79.6	4.7	2.4		0.6		58.	208.	734.
Wawick, Gov. Francis,....	Subsoil,....	0.5	4.3	4.6	90.			4.4	0.2				1000.
" G. Spencer,....	Forty bushels Corn per acre last year,....	1.8	3.2	8.41	87.3	2.9	4.5		tr.				998.
West Greenwich, Mr. Dawley,....	Grass, lime, manure and gypsum,....	2.5	5.4	4.6	86.3			4.3	0.3	tr.	94.	171.	735.
Westerly, Mr. Potter,....	Alluvial barren,....	2.5	6.	5.2	86.			4.5	0.25	0.45			1000.
West Greenwich, Mr. Dawley,....	Corn small,....	4.8	11.9	5.85	76.			5.8	0.5		80.	146.	774.
" J. P. Stone,....	Hog manure, eight loads per acre,....	4.4	13.2	5.7	76.			5.4	0.3	tr.	2.	35.	963.
Westerly, T. W. & S. Potter,....	Soil from Orchard,....	2.1	5.6	7.6	84.4			6.9	0.7		31.	147.	822.
Wickford, T. C. Sanford,....	Corn large,....	1.475	4.39	5.85	87.45	2.72	2.62		0.2	0.3	38.	183.	779.
" Judge Pitman,....	Manure, peat compost,....	2.2	6.1	6.1	85.5			5.5	0.6		23.	129.	848.
" J. C. Sandford,....	Corn,....	2.1	6.6	6.	84.2			5.8	0.2		152.	64.	784.
Woonsocket, N. Aldrich,....	....	2.3	3.5	7.1	85.4			7.1			127.	82.	774.
Woonsocket,....	Moulding sand, bright yellow,....	2.4	3.4	5.7	86.6			5.6	tr.	0.2	13.	90.	897.

* Report on the Geological and Agricultural Survey of the State of Rhode Island, by Charles T. Jackson, M. D., 1839.

TABLE 28 —COMPOSITION OF THE SOILS OF SOUTH CAROLINA.

Report on the Geology of South Carolina, by M. Tuomey, pp. 253–261.

NAMES AND LOCALITIES.	Organic Matters.....	Phosphate of Lime	Sulphate of Lime..	Phosphoric Acid...	Lime.....	Magnesia.....	Potash and Soda...	Silica.....	Alumina.....	Oxide of Iron.....	Potash.....	Water and Loss....
Granite Soils—Union	5.50	....	....	....	.20	.50	trace	82.40	6.20	2.40	....	2.80
.. .. Hills, Grindal Shoals	3.62	....	....	....	.50	.40	.50	84.30	5.80	2.00	....	2.88
.. .. Saluda, near Neely's Ferry	2.60	....	....	....	....	1.00	.60	90.00	7.40	3.00	....	5.40
.. .. Newberry	6.20	....	....	....	.04	....	.06	79.30	5.20	1.75	....	7.45
.. .. Monticello	7.00	....	....	trace	1.00	.50	.30	80.00	6.30	2.20	....	2.70
.. .. Peay's Ferry	2.00	....	....	....	.50	trace	....	75.00	8.00	3.10	....	11.40
.. .. Liberty Hill, Kershaw District	2.18	....	....	....	1.00	.40	trace	74.00	10.00	3.50	....	8.92
.. .. Chesterfield	1.20	....	....	....	1.00	....	trace	86.20	6.60	2.20	....	2.60
.. .. York village	4.50	....	....	....	1.40	.50	.06	71.60	9.40	3.70	....	8.84
Gneiss Soils—Edgefield	5.30	....	....	....	1.40	1.00	....	80.40	7.62	1.60	.16	2.52
.. .. Abbeville	1.20	....	....	....	.60	.75	....	83.00	5.40	2.00	....	7.05
.. .. Tumbling Shoals	3.00	trace	....	....	.02	....	....	80.00	7.00	4.00	.50	5.48
.. .. Anderson	1.20	....	....	....	1.00	....	....	88.00	5.40	2.30	....	2.10
.. .. Spartanburg	4.20	trace	....	....	2.00	1.00	....	70.00	8.00	3.00	....	11.30
.. .. Greenville	2.60	....	....	....	.40	.50	....	75.00	10.10	2.50	....	8.90
.. .. Glassy mountain, Greenville	6.00	....	....	....	1.00	.06	....	66.60	11.60	4.00	.40	10.34
.. .. Pendleton	8.00	....	.80	....	.90	1.00	....	70.00	10.00	2.40	.60	6.30
.. .. residence of J. C. Calhoun	....	....	....	....	.30	.40	....	80.00	9.80	2.00	.70	6.80
Trap rock soils—Flat woods	9.20	....	....	....	2.50	trace	.40	52.00	22.10	9.00	....	4.80
.. .. .. Meadow Woods	3.40	....	....	....	1.80	.50	trace	53.00	19.30	14.10	....	7.90
.. .. .. Fishing creek, Chester	1.90	trace	....	....	2.90	....	.20	60.00	20.50	8.70	....	6.70
.. .. .. near Cambridge, Abbeville	10.05	.10	....	....	4.00	....	.90	48.30	19.36	8.40	....	8.89
.. .. .. Fairfield	7.30	trace	....	....	3.00	trace	.50	56.00	20.10	6.20	....	6.90
.. .. .. Yorkville	2.20	....	....	....	2.00	....	....	69.00	16.60	7.20	....	2.50
Hornblende Slate Soils—Laurens	6.50	....	....	....	2.19	1.00	.50	60.04	13.56	6.30	....	9.91
.. .. .. Greenville	4.30	trace	....	....	2.00	....	.05	68.40	14.20	7.00	....	4.05
.. .. .. Pendleton	5.00	....	....	....	1.60	.50	trace	70.10	12.00	8.00	....	2.80
Soils o. the Mica Slates—												
.. .. Abbeville C.H.	6.90	....	....	....	.60	1.00	.70	74.30	8.40	6.00	....	2.00
.. .. Greenville	7.00	trace	....	....	1.00	.70	.35	69.40	9.30	4.00	....	8.25
.. .. Pickens	3.40	....	....	....	.40	1.00	.25	79.60	6.40	5.00	....	3.95
Soils of Talcose Slates—Lancaster	6.40	....	....	....	....	1.60	....	70.00	5.00	3.00	....	6.00
.. .. ..	4.50	trace	....	....	....	1.90	....	80.00	6.00	2.00	....	5.60
Soils of Clay Slates—Edgefield	2.40	....	....	....	trace	.05	trace	80.72	12.00	1.60	....	3.33
.. .. .. Columbia	6.70	....	....	....	1.00	.50	.40	76.30	10.40	2.00	....	2.70
.. .. .. Lexington	5.60	....	....	....	.50	trace	.30	80.30	9.00	2.40	....	1.90
Soils of tertiary formation—Aiken	8.50	trace	...	....	.50	trace	....	77.00	5.000	1.005	....	5.500
.. ..	....	....	....	....	.40	1.60	....	81.00	5.50	3.50	....	8.00
.. .. .. Lexington	6.50	trace	....	trace	.60	....	....	80.00	5.60	3.00	....	4.30
.. .. .. Richland	9.00	....	....	....	1.00	.50	trace	76.50	6.60	2.40	....	4.00
.. .. .. Bennettsville	5.40	....	....	....	.80	1.00	....	77.30	4.80	5.00	....	5.70
.. .. .. Orangeburg	5.60	....	....	....	2.00	.50	trace	66.90	9.60	6.00	....	9.40
.. .. .. Lang Syne	7.00	....	.6.	....	1.56	1.00	.50	71.00	8.50	4.00	....	6.44
.. .. .. Statesburg	4.40	....	....	....	.90	trace	....	80.30	6.60	3.70	....	4.10
.. .. .. Darlington	8.00	....	....	....	.06	trace	....	70.00	8.60	5.00	....	8.34
.. .. .. Marion C. H.	3.50	....	....	....	....	trace	.40	78.00	6.60	4.70	....	7.16
.. .. .. Beaufort	2.60	....	....	....	.60	....	....	86.50	6.00	2.00	....	2.30
.. .. .. Horry	9.75	....	....	....	.40	....	trace	67.00	9.60	5.60	....	7.65
.. .. .. Barnwell Dis.	11.00	....	....	....	1.00	....	trace	65.00	10.00	4.30	....	8.70
Alluvial Soils—Tide Swamp	27.00	....	....	....	1.00	....	....	55.00	5.50	4.00	....	7.00
.. ..	24.00	....	....	....	.80	....	....	60.00	4.80	4.00	....	6.00
.. ..	14.00	....	....	....	1.00	. .	....	70.00	3.50	5.00	....	6.00
.. ..	27.00	....	....	....	1.00	....	....	55.00	5.00	4.00	....	7.20
.. ..	27.20	....	....	....	.50	....	....	57.00	3.00	5.00	....	6.80
.. .. Rice Land	20.40	....	....	....	1.10	.50	.40	56.00	9.20	3.00	....	9.40
.. ..	10.00	....	....	....	.80	.50	trace	64.00	41.40	4.00	....	9.30
.. ..	28.00	....	....	....	.50	....	trace	60.00	4.00	2.40	....	5.10

The comparison of these results, developes facts and principles of the greatest value to agriculturists.

We shall in the present report, point out only those more general facts and principles which bear immediately upon the relations of lime to soils and organized beings.

My investigations upon the soils of Georgia will not be completed for a considerable length of time, and I have not therefore classed the partial results, thus far obtained, with these tables. When completed, comparisons will be instituted with the facts here recorded; these tables will, therefore, independently of their present interest, be valuable for future reference.

In examining these tables, with minds occupied with the present subject, the first fact which strikes our attention is, that soils differ greatly in the proportion of lime.

(a.)—*The Proportion of Lime varies in different soils. Cause and influence of this variation.*

If we knew with certainty the chemical constitution of the rocks from which a soil has been derived, and the changes through which it has passed, and the various agencies, chemical and mechanical, to which it has been subjected, we could, in a general manner, not only predict the chemical constitution, but also give the efficient cause of the presence or absence of the various constituents.

Whilst it is an established fact, that all soils were originally produced from the disintegration and decomposition of rocks, effected by various chemical and mechanical agencies, air and water, heat and electricity, currents and waves, and by the slower actions of the vegetable and animal kingdoms; nevertheless, it is often difficult to determine with precision the rocks from which soils have been derived, and it is still more difficult to determine the various agencies to which they have been subjected, and the various chemical and physical changes through which they have passed, for soils are often derived from rocks hundreds of miles distant, as is the case with the soils of the Tertiary and recent formations of Georgia.

When we reflect that the continents now inhabited and cultivated by man, have been in past ages submerged for unnumbered centuries, and that the surface of continents have been formed by the materials resulting from the old rocks, which appear to have been first in a molten condition;

when we reflect that the materials derived from the disintegration of these older rocks, form strata thousands of feet in thickness; when we reflect that the continents have been subjected to various elevations and depressions, standing out for thousands of years above the waters of the ocean, subjected to the slower action of the atmosphere, moisture and the vegetable kingdom, moved by the forces of the sun—submerged for thousands of years, subjected to the action of mighty and irresistable currents, which have conveyed the disintegrated materials thousands of miles from the point of disintegration, we will have a clear explanation of the fact so important to the agriculturist, that soils do not necessarily correspond in chemical constitution with the rocks upon which they lie. We have in the counties of Screven, Burke, Washington, Jefferson, and many others, in the Tertiary formation of Georgia, a clear demonstration that soils do not necessarily contain the same elements as the formations upon which they rest.

Thus, in the region of country to which we refer, we have first the upper layer, the surface soil, composed of the products of decaying vegetation, sand, clay, and various inorganic salts, necessary for vegetation—this varies in depth from one inch to one foot. Beneath this, we have a layer of sand, pebbles, and clay, varying in depth from one to six feet. The pebbles found in this second strata, or more properly subsoil, appear to have been removed from northern regions during the last great geological deluge, which took place after the elevation and consolidation of all the rocks, and subsequent to the deposition of the tertiary clays. In Richmond, and other counties lying to the south of the primitive region, we find that not only were soils and pebbles removed to great distances, by this last great geological deluge, but that large masses of rock have been transported by it, and deep excavations have been made by the currents in the tertiary formation, and filled with sand and pebbles; and that in the vallies of Burke, and other counties, the joint clay has been almost entirely denud-

ed and swept off by this current. Beneath this bed of clay and pebbles, we have the joint clay, resembling chalk, but differing wholly from it in composition, containing only a small proportion of carbonate of lime, apparently deposited at the bottom of a deep still sea, for it contains no pebbles or rocks, of any size, and but very few organic remains. Beneath this bed of joint clay, which varies in thickness from 6 to 60 feet, having in certain localities been greatly denuded by the last great geological deluge, we find the marls and shell limestone of the Eocene formation, which are known in some parts to be more than 300 feet in thickness. Now, whilst the lowest formation, the shell limestone, is almost entirely composed of carbonate of lime, with little or no sand or alumina, the joint clay, immediately above, and resting upon this conglomerate of fossil shells, contains not more than from ½ to 4 per cent. of carbonate of lime, and is composed of sand and alumina, and silicate of alumina and other bodies; and the yellow clay and drift materials resting upon the joint clay, contains still less lime; and the soil which the planters of this region cultivate, contains very little more lime than soils which are entirely removed from lime formations.

With truth then we may affirm that the examination of the chemical constitution of soils reveals great and leading truths to the agriculturist.

If the planter takes the view that soils are in every case derived from the rocks upon which they rest, he would in Burke and Jefferson, and other counties where lime formations underlie the soil, affirm that marling was useless, because the soil must already contain an abundance of lime.

Chemical analysis corrects the error, and leads to the inauguration of that system of culture by which the treasures so bountifully bestowed by Providence, will be made to restore the abused and exhausted soil to a degree of fertility superior even to that possessed in its virgin state.

There are countries, however, in which the soils have been derived from the rocks upon which they lie, and the

character of the soils have been in such cases determined by the physical and chemical composition and properties of the rocks.

Thus, in the Highland district of New York, there are two distinct varieties of soil, derived from the same class of rocks (the primitive rocks); the one derived from the ordinary coarse granite, called potash felspar, contains a large proportion of the silicates of alumina and potash; whilst the other, derived from the lime felspar, belonging to the hyposthene rocks, and composed in great measure of labradorite, and devoid of mica, contains a greater amount of the silicates of lime and alumina.

The soils derived from the latter, are more suitable for the cultivation of wheat than the soils derived from the potash felspar, because they contain more lime.

The soil of the old red sandstone of New York corresponds in its general chemical constitution to the rocks from which it has been derived. It contains but little lime, and, under cultivation, is speedily exhausted, and in order to produce crops, it has been found necessary to add lime with all the manures.

The soils of the wheat district of New York, embracing the central and western counties, which are considered to be equal to any wheat soils in the United States, do not appear to derive their valuable properties of yielding large crops, and of remaining fertile for long series of years of continued culture, so much from the organic matters, as from the inorganic elements derived from the rocks upon which they rest.

The investigations of Professor Emmons,* of New York, upon this wheat district, which extends from the south shore of Lake Ontario to a line drawn through the middle of Cayuga and Seneca lakes, have shown that the great fertility and inexhaustible nature of this wheat soil is due to the fact that it has been derived chiefly from the decomposition of the calcareous shales associated with the lime-

* Natural History of New York Agriculture, vol. 1, pp. 272–275.

stones of the Onondaga salt group, and from the grey and red marl of the Medina sandstone, and from the calcareous shales and slates of the Ontario division.

That the composition of the soils of the wheat district of New York corresponds to the composition of the rocks from which it has been derived, may be determined by comparing the constituents of these soils as recorded in the tables, with the following analyses by Professor Emmons, presenting the composition of the most important rocks from which these soils has been derived:

	Red shale of the Onondaga salt group—Sandy variety.....	Red shale of the Onondaga salt group—Marly variety.....	Soft, greenish marl succeeding the red shale, containing cavities in the form of the hollow cubical crystals of chloride of sodium..	Vernicular lime rock occurring with the red and green shales and greenish marl.....	Bedded limestones—compact and hard. The soft green shales pass into these compact limestones..... Analysis by Dr. Beck.	Bedded limestones—compact and hard. The soft green shales pass into these compact limestones..... Analysis by Dr. Jackson.
Carbonate of Lime.....	10.25	9.89	43.06	13.76	.. ..	....
Carbonic Acid.....	.. ....	.. ....	....	20.62	39.80	41.20
Lime.....	.. ....	.. ....	....	.. ....	25.24	25.08
Potash.....	.. ....	.. ....	....	.. ....	.....	0.7
Soda.....	.. ....	.. ....	....	.. ....	.....	2.18
Magnesia....	5.75	0.40	2.17	4.26	18.80	12.87
Phosphate of Alumina and Iron.....	.. ....	0.14	....	.. ....	....	....
Organic Matters.....	0.57	0.87	5.00	2.54	....	....
Sulphate of Lime.....	.. ....	.. ....	1.06	.. ....	....	....
Sulphuric Acid.....	.. ....	.. ....	....	.. ....	....	0.60
Peroxide of Iron and Alumina...	6.25	14.98	13.36		....	....
Silex....	68.25	68.86	34.56	3.30	13.50	10 08
Water....	1.00	6.48	0.56	0.23	1.41	1 18
Soluble Saline matters, consisting of Sulphates of Soda, Magnesia, Chlorides of Sodium, Magnesium and Calcium, Sulphate of Lime and sometimes Alumina....	0.68	2.63	5.50			
Alumina....	.. ....	.. ....	....	5.33	....	3.39
Peroxide of Iron..	.. ....	.. ....	....	a trace.	1.25	3.274

Treatment of Varicose Veins of the Legs and of Varicocele. From a Clinical Lecture, at University College Hospital. By John Erichsen, Esq., Professor of Surgery and Clinical Surgery.

I am about to direct your attention to-day to the treatment of a disease of sufficiently common occurrence; namely varicose veins.

Varix may occur whenever the veins of a part are subjected to pressure, and is met with most commonly in those of the lower half of the body. In the inferior extremity this is owing partly to pressure of the abdominal viscera on the inferior cava, partly to the weight of a long column of blood in the vein, partly to the pressure inflicted on the deep veins during muscular action, causing obstruction to the onward flow of the blood. The veins of the spermatic plexus are also frequently the seat of varicose enlargement from causes of a similar nature.

Varicose veins of the lower extremity, in the majority of cases do not give rise to sufficient annoyance to need operative interference. Usually palliative treatment, such as the pressure of bandages, elastic-stockings, etc., suffices to alleviate the slight inconvenience occasioned by the loaded state of the superficial veins. It occasionally happens, however, that this condition leads to such consequence as to produce serious interference with the health and comfort of the patient. In such cases palliative measures are no longer of service, and it behoves the surgeon to effect the radical cure of the varix by operation.

Operative interference in varix of the lower extremity, may be rendered necessary by these conditions.

1. The veins being of very considerable size and very tortuous, they may by compressing the nerves, produce so much pain, and so great a sense of weight in the limb, that the sufferer is unable to make any exertion, being even crippled, and so far disqualified from entering the public services in a naval or military capicity.

2. When an ulcer occurs, and refuses to heal, in consequence of congestion of its capillaries, the granulations becoming œdematous and the surface sloughy and unable to cicatrize.

3. If a varicose vein has burst, as it is called, that is to say, it has opened by an extension of an ulcerating surface through its walls, an abundant, alarming and even fatal hemorrhage may take place.

These are the three reasons for operating in cases of varicose veins situated in the lowest extremities. Surgeons, however, have been loth to operate in those cases, because they have dreaded the effects of exciting inflamation in the veins, which may become suppurative, and so run on to pyæmia. This danger does exist undoubtedly, but it must be exceedingly trifling if the operation is properly conducted; for, on looking over my records, I find I have operated more than two hundred times, in this hospital in such cases, and have never lost a patient, nor never had a case of suppurative phlebitis or of pyæmia. The danger is slight, if the precaution of not opening the veins is followed. If the vein be opened, air is admitted into the wound, and the adhesive inflammatiou is not set up, but the suppurative form arises in its stead whereby pus may get into the circulation, and pyæmia follow. Therefore, the chief object is to confine all inflammation to the adhesive kind; whilst this is present, there is no danger.

There are many modes of treatment in varix, all having one object in view—viz: that of causing occlusion of the vein by the adhesive inflammation. But, in my opinion, all measures should be avoided which include opening the vein, whether this done by caustic or by the knife, as they are extremely dangerous, by leading to suppuration within; so, also, are those plans of treatment by which we break down the exuded lymph and coagula, or open up the vein even when occluded.

I shall not enumerate all the methods before the profession for the radical cure of varix but proceed to describe those which I have for many years successfully employed in this hospital. The plan I ordinarily pursue, and which you have seen me adopt dozzens of times is as follows: A hair-lip pin is passed underneath the vein on one side, and its point brought out on the other, a piece of elastic bougie about an inch in length is then laid over the vein parallel to its course. Then, by means of a silken thread twisted over the bougie and under the two ends of the pin, the vein is compressed between the pin and bougie. In performing this operation there are one or two little points to be observed. The first is to be careful not to transfix the vein with the pin; if the vein be opened, and the pin lie across it, there is danger of suppuration, as the pin acts as a kind of seton in the vein. This inadvertence is avoided by dipping the pin deeply whilst passing it under the vein.

In this way there is no risk of piercing the vessel. If a drop or two of venous blood exude, by the side of the pin, through the puncture the vein has been perforated and the instrument should be withdrawn and passed again. If the vein is unharmed the operation is bloodless. The second point is that the ligature should not be so tight as to cause ulceration by strangulation of the parts compressed. If the threat be moderately tight only, and the pin made, as it generally now is, of unoxidizable iron it is quite passive and does not rust, hence excessive irritation is avoided. The bougie and pin should remain about ten days, at the end of which time the vein is converted into an impervious cord of plastic matter and coagulum. When this is attained the pin may be removed, the limb bandaged and the patient may leave his bed.

It has been objected to this and to all other operations for varix that the cure is not permanent; that the varicose condition is apt to return; that the same veins perhaps are not affected again in this manner, but that others speedily assume a dilated and tortuous state. No doubt this is the result in some instances, but in many cases which I have had an opportunity of examining years afterwards, the cure has been permanent; and, in the meantime the object for which the operation was undertaken is served.

Another method which is much used in France, and which I have occasionally employed myself in this hospital for some years past, is that of injecting a small quantity of a solution of the perchloride of iron of specific strength into the veins by means of Pravaz's screw-syringe. In this way the blood contained in the dilated vessel is made to coagulate and thus the passage through the vessel is occluded. The adhesive inflammation at the same time being excited, permanent obstruction is attained and a cure effected. This, though a valuable means when the vessels are knotted and sacculated, is not, I believe, so good a one as the pin and ligature, because I have seen it followed in two or three of these cases in which I have had occasion to use it, by circumscribed abscesses and even sloughing of the adjacent parts, though no fatal result has yet occurred in my practice. On this account I consider this mode of treatment undoubtedly more dangerous, and I think it ought to be confined to the cure of those cases only where the knots are so large, and so clasely matted together, that the pin cannot be passed underneath them.

The next distribution of veins liable to varix is that formed by the spermatic plexus. Dilatation of these vessels—varicocele—is often met with in young men; and much benefit can be afforded by paliative means, such as supporting or compressing the tumor in various ways; for instance by raising scrotum in a suspensory bandage, or by wearing a mocmain truss, etc., and one or other of these contrivances generally gives sufficient relief for the patient's comfort. But I have found it necessary to have recourse to more active measures than these, and to adopt operative treatment in three of these cases which have presented themselves during the present session. The circumstances, for which operation may be and has been practised in these and similar cases, can be arranged in the four following categories:

1. The existence of a varicocele disqualifies the sufferer from admission into the public services. This, in my opinion, is a perfect legitimate reason for operating. One of the cases on whom I recently effected a radical cure was that of a man in the prime of life, who, wishing to enlist in the Marines, was refused solely on the ground of having a small varicocele. This I cured by operation, and the man afterwards entered the service.

2. In cases in which the presence of a varicocele of ordinate size causes a distressing sense of weight and pain in the loins and groins, and often inability to stand or walk for any length of time, in these cases when the patient is in continual discomfort, or more or less prevented from pursuing his avocations, in fact, quite crippled, it is perfectly justifiable to resort to operation.

3. When atrophy of the testicle is a consequence of the pressure of the blood in the veins.

4. In cases also where the pressure of the enlarged veins on the spermatic nerves produces repeated attacks of spermatorrhœa; and these cases, gentlemen, are by no means uncommon. These are, however, more frequently met with out of the hospital than in individuals of the class who apply to such institutions for relief. In fact, young men of the more highly educated classes are very subject to it, especially these who habitually lead a sedentary and studious life, as for instance, young clergymen and lawyers. In these persons a peculiar hypochondriacal state is brought on by the tendency of the mind to dwell on the condition of the genital organs, and the patient is constantly fidgeting about the local and tangible disease he observes in them.

This was the case of the patient on whom you recollect I operated a short time ago for double varicocele, and who has received a better education than most hospital patients, for he belongs in some degree, to the medical profession. His anxiety with regard to this disease, though the veins affected have been perfectly occluded by the method presently to be described, is still so great that at his earnest importunity, I removed, last week, a portion of the scrotum which happened to be rather more pendulous than is usual, partly in order better to support the testis, and partly that his morbid feeling on this subject might in some degree be assuaged.

Now how should the radical cure of this condition be produced? To this I would answer—By exciting adhesive inflammation of the spermatic veins through an application of the same principle which sets up that process in the veins of the lower extremity. There are several different ways of doing this; some are very objectionable. The twisted suture, as applied to the veins of the leg, induces two great irritation in the scrotum, and there its introduction if often followed by violent inflammation or sloughing; or by opening up the cellular tissue of the scrotum with œdema, and even purulent infiltration. It is better, I think, not to use this method here, indeed, I have twice, in the practice of others, seen it followed by death. The plan I have adopted for some years is that suggested and practiced by Vidal, a distinguished French surgeon, and is as follows: The vas deferens readily distinguished by its round cord-like feel, is first separated from the veins, and intrusted to an assistent; next an iron pin bored with a hole at each end, is passed between the vas and the veins, and brought out, first notching the scrotum with a scalpel at the point of perforation; then a silver-wire, threaded on a needle so constructed that the wire shall follow it without catching, is passed in at the aperture of entry of the needle, and then carried between the integument of the scrotum and the veins, the wire is brought out at the second puncture. Each end of the wire is now passed through the corresponding hole of the pin which is twisted round and round repeatedly, each turn causing the wire to be rolled round the pin, and so tightened till the veins are firmly compressed between the pin behind and the loop of wire in front. By this means the scrotum is quite free and uncompressed, and there is no danger of arousing inflammation or œdema.

The wire should be tightened from day to day, as it causes ulceration in the veins, until it has completely cut through, which results, usually, in about a week or then days. Meanwhile there is much plastic matter thrown out round the veins. This finally counteracts and obliterates their channels. This method is an effectual and permanent cure, as we had an opportunity of seeing, in the case of a porter at this hospital, on whom I performed this operation with perfect success, for he remained here for three years after the operation, during which time he was perfectly free from any return of his disease. Of late, I have been in the habit of employing a simpler method, one which you saw me adopt about ten days or a fortnight ago. I separated the vas in the usual way, and then made a small incision, about half an inch long, in the front and back of the scrotum, afterwards passing a a needle armed with silver-wire, as before described, between the vas and the veins, bringing it out behind, then returning the needle, but this time carrying it in front between the veins and the skin, and so including the veins in a loop of wire without implicating the scrotum. This is then tightly twisted together so as to constrict the inclosed vessels. The plan had a similar effect to that of the wire and pin combined; by repeated tightening the wire gradually effected a passage, by ulceration through the veins, which were obliterated by the same process.

It has been objected to this and similar operations that, athrophy of the testis may take place from its arterial branches being included together with the veins, but as the spermatic artery runs near to the vas deferens, it is held out of the way with the duct, it escapes, and the chance of that mischief is avoided. Nevertheless, atrophy of the testis may coexist as the result of long continued pressure of the blood in the vessels of the gland before the operation was performed.—*British Medical Journal, Feb. 25th.*

In Brooklyn City Hospital. By the Injection of Persulphate of Iron. By James M. Minor, M. D., Attending Surgeon.

The following cases possess the double interest of novelty and practical utility.

There are none of a similar character on record, except those in which this treatment was adopted subsequently to, and in imitation of them.

It will be observed that I have introduced a case of *aneurism*, treated with injections of the perchloride of iron, among cases of varicose veins, treated with the persulphate. In doing so, I have violated the harmony of pathological relation, in order to illustrate the efficiency and innocuousness of the preparation of iron. The first case was in private practice, the others were treated in Hospital.

Case 1.—*Popliteal Aneurism cured by the Injection of the Perchloride of Iron.*—On the 9th day of November, 1857, I was requested by Dr. Jas. Crane to see Mrs. T. I found a small, pulsating, superficial, aneurismal sac, between the right labium and thigh, about the diameter of a Madeira nut, and projecting about half an inch above the surface. From it projected a small nipple-like, or rather tubular, offshoot, from which, previous to its ligation by Dr. Crane, arterial blood spouted *per saltum*. Mrs. T.'s account of it was, that about seventeen years previously she had received a severe blow at that point while entering a stage-coach, from the heavy iron hook attached to one end of the "back strap" of the middle seat, causing very severe pain at the time, but of short duration. Is not absolutely sure how long she has felt pulsation, but thinks that about a year since it became very distinct, and assumed the purplish tinge it now has; pulsation was more active at every menstrual period. A careful examination, by alternate pressure upon the femoral, and at a point posterior to the sac, shows a supply trunk, probably from some one of the perforating branches of the profunda femoris in front, and the obturator behind.

Upon consultation between Drs. Crane, Isaacs, and myself, and at Dr. Isaacs' suggestion it was determined to use injections of powerful styptics. This course was adopted in view of the manifold difficulties in the way of an effort to tie the supply trunks.

There were four several attempts made, at intervals of about a week, with solutions of lactate, muriated tincture, and perchloride of iron, using at the same time Signoroni's tourniquet to control the circulation through the femoral artery, and lessen the tendency to wash away the newly-formed clot. It was impossible to exert much force in controlling the current from the obturator artery, as the finger alone could be used.

The solution of the perchloride alone sufficed, with aid of the tourniquet, and the recumbent posture, to effectually

coagulate the blood and block up the sac. The pain caused by the perchloride was very severe, and continued for twelve hours, and was followed by considerable inflammatory action. It was completely successful, and Mrs. T. recovered with entire obliteration of the sac. The tourniquet was kept on for some days, being loosened at intervals, to lessen the intolerable pain caused by the pressure. The filling by granulation of the cavity left where the coagulum came away (which it did by ulceration) occupied some weeks.

The notes of this case having been lost, will account for the omission of some points of interest. They have been drawn out from memory, and by the aid of the patient.

The following cases of varicose veins, treated by the injection of persulphate of iron, occurred in the Brooklyn City Hospital, the notes of which are furnished me by R. P. Moore, M. D., House-Surgeon.

Case 2.—*Varicose Veins of Leg—Injection of Persulphate of Iron—Cured.*—John Towle, admitted on March 1st. 1859, (Dr. Enos on duty), with ulcer from varicose vein on leg, of five years' duration; it has healed repeatedly, but again reopened. Ordered poultice, and rest in recumbent posture.

April 25th.—Ulcers nearly healed. Injected liquor ferri persulphat. gtt. x.*

May 2d.—Veins obliterated at point of injection; neighboring branches still viracose.

May 20th.—Ulcers entirely healed, and patient permitted to go out on a pass. Returned drunk, with abrasion of newly cicatrized surface.

June 13th.—Discharged cured.

Case 3.—*Varicose Veins of Scrotum—Injection of Persulphate of Iron—Cured.*—J. T., aged 22, American, admitted under Dr. Minor, Oct. 24th, 1859, with varicose condition of scrotal veins of left side. Has enjoyed very good general health. For six months past has suffered much pain from distended veins of scrotum, extending through spermatic cord to inguinal canal of that side, and also in the testicle; can obtain no relief except in recumbent posture. Ordered cathartic. Suffers with languor and debility from involuntary seminal emissions, after which the pain is much aggravated.

Oct. 28th.—Injected four drops of a solution of persulphate of iron (four parts of water to one of persulphate)

*Officinal solution contains 43 per cent. of the solid presulphate.

with Pravat's syringe, as modified by Tiemann. Patient was made to stand erect in order to fill the veins, and make them more distinct and prominent—a necessary precaution in such loose tissues as are found in that region. He fainted, but was soon restored by placing him in a recumbent posture. The operation scarcely caused any pain, either at the time or subsequently. A firm coagulum was formed in thirty seconds. Ordered cloths dipped in water to the part, and recumbent posture.

Nov. 3.—The clot formed by persulph. ferri gives indications of coming away by ulceration. Has felt less pain in cord since operation; nor does he feel any pain at the point of puncture.

Feb. 6th.—Clot came away last night, leaving a healthly granulating surface.

26th.—Discharged.

Case 4.—*Varicose Veins of Scrotum—Second Injection—Cured.*—James Taylor was admitted a short time after his discharge in November last, with varicose condition of other deep scrotal veins near the cord. The verniform mass of enlarged veins around the point of former operation are entirely obliterated. Has been variously treated since second admission, but without resort to operative measures.

Feb. 14.—Veins increasing in size, attended with pain. Injected three drops of a solution of persulphate of iron in the proportion of one part persulphate to two of distilled water, followed by immediate coagulation of blood, as on former occasion, and with as little pain.

15th.—Injection seems to have entirely relieved the pain in the cord, and he expresses himself as feeling better in every particular.

19th.—Continues comfortable. Some pain and heat at the point of puncture, where there is an exceedingly hard and prominent tumor. Tumor is close to the cord, and seems in some measure to involve it. Seminal emissions occur at long intervals now. Cold water dressings.

26th.—Clot decreasing in size, but still very hard. No appearance of ulcerating, as on former use of the persulphate.

March 1st.—Tumor has steadily decreased in size; but little hardness remains. Veins completely obliterated when injected, as well as all others which were enlarged.

Case 5.—*Varicose Veins of Leg—Injection of Persulphate*

of Iron—Cured.—Carl de Buke, admitted December 22d, 1859, with paronychia of left thumb. Varicose veins in left leg, which he has had for many years. Veins very much distended at one point. Owing to the size of the veins it was thought necessary to insert a larger quantity of the solution than usual.

Feb. 11th.—Ten drops of a solution of the strength of one part persulphate to three of water, was used.

12th.—A clot has formed, and obstructed the vein, though it does not appear to be so firm as in previous cases.

14th.—Complains of pain at point of puncture, where there is a considerable swelling and redness. Apply cold lotion.

16th.—Inflammation and pain subsiding. Continue lotion. No constitutional disturbance at any time.

22d.—Tumor lessening in size, and redness disappearing.

March 10th.—All inflammatory symptoms have subsided, and the vein is obliterated at point of operation.

Case 6.—*Varicose Veins of Leg—Injection of Persulphate of Iron—Cured.*—James Flemming was admitted Dec. 29th, 1859, with secondary syphilis, and ulcers on right leg; has varicose veins of the same leg, which are increasing in size, and he expresses a wish to be operated on for their relief.

Feb. 11th.—Injected as usual, three drops of a solution of the persulphate of iron, one part to four of water. A second puncture was made below the first.

13th.—Coagulum formed, but not so marked as in other cases. No inflammation about punctures.

19th.—Ulcer on leg has improved rapidly since operation.

27th.—Old ulcer cicatrized, and he desires to leave the hospital. Discharged cured.

It may be desirable to state briefly, the mode of procedure in the injection of varicose veins. A Pravat's syringe as modified by Mr. Tiemann, is the instrument used. This is a very small syringe of vulcanized rubber, having a small (almost capillary) canula screwed to its lower end. This canula is cut obliquely at its extremity somewhat after the manner of a pen, ending in a sharp point. The piston rod is graduated to drops, to admit of the use of any quantity no matter how small.

The canula being screwed on, the quantity of the solution desired to be used is drawn in through the canula, which is then plunged into the vein, the patient standing erect. The finger of an assistant is then placed upon the vein, a little

above and below the point of puncture, and firm pressure made; the piston is then forced down and the fluid injected. It is important that the pressure on the cardiac side of the puncture, should be sufficient to completely stop the upward current, as otherwise portions of the clot might be carried into the circulation. The pressure need be kept up for a minute or two only.

This completes the operation. The patient is placed in the recumbent posture, and cold water dressings applied, with directions not to rise for some days. The above mode of treatment of varicose veins, would seem to promise a safe, prompt, and painless cure, of a most uncomfortable, painful, and sometimes perilous complaint, for which, heretofore, there have been only uncertain and dangerous expedients.

The persulphate of iron as far as heretofore used, seems to excite adhesive inflammation alone, thus avoiding that formidable affection, pyæmia; and I feel confident in recommending it to the profession, as a safe, simple, and almost certain remedy for varicose veins, and with some qualifications for *small* aneurisms.—*American Medical Times.*

On Monsel's Persulphate of Iron. By George S. Dickey, Jr., of San Francisco, Cal.—I give you my formula, the result of numerous experiments when I first undertook its manufacture.

℞.	Aquæ destillatæ,	℥lxxx.
	Acid. Sulph. Com.	f.℥ix.Xf℥iii.
	Ferri Sulph. Puræ,	℥c. troy.
	Acid, Nitric. "	f.℥viii. or q. s.

Mix the water and sulph. acid, and dissolve in the mixture one-half of the sulphate of iron with the aid of heat. Bring up the mixture to a brisk boil, and add the nitric acid little at a time until effervescence ceases, and while still boiling add the remainder of the sulphate of iron little by little, and boil until effervescence ceases. Filter the solution, evaporate to a syrupy consistence and spread on plates of glass to dry. It requires considerable heat to dry perfectly, but is quickly dehydrated by a too long continued heat. When dry, it is necessary to detach it from the plates with a chisel.

The article has attained great celebrity here, principally as a hæmostatic and as a local application to venereal ulcers.

I have manufactured and sold more than two thousand (2,000) ounces during the last year and a half, and its sale still continues, in fact, increases.

I have never yet met an instance of its failure to stop bleeding when properly applied, and it is only necessary that the dry salt should be sprinkled on the wound.

I have been much surprised that it has been so long getting into use in your section, as I sent two or three samples to different parties near a year since.

Very truly yours,

GEO. S. DICKEY, JR.*

*The specimens of the salt received from Mr. Dickey were the finest we have seen; perfectly dry, in very thin scales, translucent and of a light reddish brown color, very soluble and astringent.—ED. AM. J. PH.

A Case of Paralysis Agitans removed by the continuous galvanic current. By J. Russell Reynolds, M. D., F. R. C. P., Assistant Physician to the Westminster Hospital.

CASE.—W. F—, male, æt. 57; married at the age of twenty, and the father of twelve children; height, 5 ft. 10½ in.; weight, under 11 st. No anatomical deformity; no hereditary predisposition to disease; has had good health; has lived well and temperately. His occupation is that of a carpenter; he has resided in a healthy locality, and has never, until the commencement of his present illness, suffered from anything of a similar kind.

For the last five years he has had anxiety with regard to his children, and distress at parting from them, but he cannot definitely refer his malady to this cause. During the last two years he has noticed occasional tremor of the right arm and leg, the latter being affected less frequently and less severely than the former. The tremor has occurred if he (1) has been "put out about anything;" (2) has attempted to lift anything very heavy; (3) has "taken cold;" (4) has lifted liquid in a cup to the mouth; or (5) has fully extended the arm and forearm, and pressed anything firmly with the palm of the hand. But under all these circumstances the tremor has ceased when the "exciting cause" has been removed, and it has never been so severe as to prevent him from following his occupation, which is one requiring much exertion and accurate direction of movements.

For the last six or eight months he has suffered occasional vertigo—i. e. a "feeling as if he should fall, or pitch on his head; and as if the head were tied up in tight bandages." At the same time there has been darting pain through the head.

On September 20th, he was at work as usual—was alternately stooping down and lifting over his head—when he suddenly felt vertigo, aching in knee-joints, and general disturbance; and at the same time violent shaking occurred in the right upper extremity. The agitation of the right arm continued throughout the day, but stopped at night. It returned on the following morning as soon as he moved.

On October 5th, he was seen by myself, and on this day (the fifteenth from its commencement) the agitation was extreme. Nevertheless, it had always ceased during the night, and on two occasions, for about an hour, and without assignable cause, during the day. He thinks it is arrested at night by pressing the anterior surface of the forearm against the crest of the ilium. With the exception above mentioned, the movements of the arm have been much the same as now seen; being occasionally aggravated, but not much, by emotional disturbances, or by the attempt at voluntary movement of the extremity.

The whole of the right upper limb is involved—i. e., the hand moves on the forearm, the forearm on the arm, the arm on the shoulder; but the most constant and most extensive movement is that at the elbow-joint; the least constant and least extensive is that at the shoulder. Almost every direction of movement possible in the upper extremity is performed; from 22 to 24 double movements occur in five seconds, and the range of movement at the hand, when, for example, the jerking is principally that of flexion and extension of the forearm, varies from nine to ten inches. The movement, therefore, amounts to about eight feet per second.

To the patient himself the right arm feels hotter than the left, and a difference of temperature is very obvious to the hand of the observer. Temperature over left biceps, 87° Fahr.; over right, 91°.

The involuntary movement of the arm can be arrested by his lying on the sofa, and pressing the forearm against the ilium; but any attempt to move the limb voluntarily at once reproduces the shaking, although he remains in the recumbent posture. The movement is, moreover, instantly arrested by my firmly grasping either the forearm in any part of its upper two-thirds, or the arm in its lower third. This is not a mere mechanical arrest of the movements, for it cannot be effected by holding the wrist; and the jerking recommences if, while the extremity is grasped in the man-

ner described, the patient makes any attempt at a voluntary movement. The pressure is not painful, nor is it so directed as to arrest the circulation.

The mental condition of the patient, and his general health, appear unaffected.

Sensibility is unchanged in the right upper extremity; there is no deviation of the tongue, nor distortion of the features. He can walk well, and without dragging either leg; there is only occasionally slight tremor of the right leg.

A continuous galvanic current (direct) was applied to the arm and forearm, the movements of the latter being at the time arrested by pressure. At the end of five minutes he could execute voluntary movements without the least tremor, and emotional excitement failed to reproduce the jerking. The temperature of the two arms, examined after the current had been passing for half an hour, was equal. The involuntary movements did not return until three hours after the current was discontinued; they then reappeared, and continued throughout the evening; stopped at night, but returned on the following morning.

October 6th.—The current was applied while the arm was in violent movement, but in two minutes it became perfectly still. Application continued for an hour.

7th.—Last evening there was no jerking nor tremor for five hours after the current was discontinued; then it commenced, but stopped spontaneously in about half an hour, and during the remainder of the evening there was nothing more than very trifling tremor. The jerking has returned this morning, but is much less than on the first day of observation. There are but twenty alternations in fifteen seconds, and the range of movement is from three to four inches. The movement, therefore, is only 86 foot per second—less than one-eight of what it was three days ago.

The current was applied on the 7th, on the 8th and 10th, and after the 10th—i. e., after five applications—the spontaneous jactitation completely ceased. When any weight is held in the hand, and it is lifted towards the mouth, there is tremor; but this is slight, is not more than has occurred for the last two years, and it immediately ceases when the effort is discontinued. The arm and hand are weak; every movement can be executed by them voluntarily, but such movements are feeble.

28th.—Has written me a letter in good and legible hand.

The current was applied about every other day, for an

hour, until November 10th, and during this time there was steady increase in the power of the limb, and the jactitation did not return. No medicine of any kind was given.

November 12th.—Quinine and iron were ordered.

15th.—W. F— is in perfect general health; there is no jactitation, and only the slight tremor already described, when the hand, with something in it, is raised towards the mouth.

The current employed in this case was derived from a Pulvermacher's chain battery of 120 links.

The above case requires, I think, no comment. It is more important that a fact of this character should be placed on record than that any speculation should be advanced in regard to the pathology of "paralysis agitans," or the *modus operandi* of the continuous galvanic current. The term which I have employed to denote the case involves no theory; it is but the name of a prominent symptom—a symptom which, in this instance, constituted almost the whole of the affection, and which, after a fortnight's duration without the slightest tendency to improvement, was quickly, but progressively and effectually, removed by a special form of treatment.

That this result of the contineous current is not to be attributed to mere accidental coincidence is, I think, evident from the history of the case. Moreover, a similar result appears to have been obtained by Remak. In Schmidt's Jahrbilcher, Jahrg., 1857, bd. 94, p. 102, there is the following entry: "Paralysis agitans, bei einem 60 jahr. manne in 15 sitzg. beseitight."—*Lancet*, *Dec.* 3, 1859.

Palliative Treatment of Cancer. By Mr. Thomas Hunt.

Mr. Hunt's remarks apply only to those cases of true scirrhus in the breast in which there is a hard and movable tumor, not yet advanced to the stage of ulceration.

One indication in this condition of things is as far as possible to prevent the occurrence of ulceration. The author regards this process as chiefly the result of the pressure sustained by the skin and cellular membrane, from one hard substance within (the stony tumor), and another hard substance without (the patient's corset). This pressure is generally sufficiently severe not only to give rise to pain, but to effect, first, a congestion of the healthy vessels, and secondly, an absorption of the healthy structure, without being

sufficient to absorb (as has been proposed by higher pressure) the cancerous tumor itself. A second indication is to support the tumor, without undue pressure; and a third, to relieve the pain.

All these purposes are easily accomplished, in most cases, by the following expedients: The whole breast should be allowed to rest on a thick broad compress of cotton wadding. When the breast is very pendulous, an old silk handkerchief may be passed, as a sling, between the mamma and the wadding, and tied over the opposite shoulder, one tail of the handkerchief being passed over the clavicle, the other tail over the scapula and spine; and all should be included in a capacious corset, which will then become a comfortable support, instead of acting as a tormenting vice. When the pain has been very severe, the author has applied to the skin a belladonna plaster, spread thinly on soft thin leather. This, by encompassing not only the whole breast, but an inch or two of skin beyond it in all directions, will materially assist in giving comfortable support, and also in allaying the irritability of the nerves. By this local treatment the author has often succeeded in relieving the patient of all pain for months together, and also in preserving the isolation of the tumor, and in many cases diminishing its size.

Together with this local treatment, great attention should always be paid to the bodily health and mental tranquility of the patient. She should be encouraged to hope that her pains may be much relieved, if not entirely removed; that the disease may probably be checked, or even so far subdued as to become for a very considerable period comparatively harmless and benign. The health should be sustained by a generous but regulated diet; by engaging the patient as much as possible in cheerful society; and last, not least, by moderate but frequent exercise in the open air, in a locality where the atmosphere is pure and mild. This will be far, very far, better than confinement in the house, and infinitely better than confinement in the wards of a hospital containing patients with open wounds. If the health is feeble, much good will be derived from the following formula:

℞. Tinct. ferri sesquichloridi, ʒiij;
Liquor arsenici, ʒv.
Aquæ destillatæ, ʒviij.
M. Capiat minima xl ter in die ex aqua post cibum.

The dose of both the iron and the arsenic must be regulated by their respective effects. The iron is generally useful and necessary, the arsenic always; for, although the author had rarely found a cancerous tumor entirely dissipated by arsenic, he has as rarely known the mineral fail to check its onward course. It most assuredly exerts, when discretly administered, a certain amount of specific influence over the disease. He wishes he could say more than this in favor of arsenical treatment; but truth requires that he should stop here. That there is no medicine which is so uniform and potent in its controling power over this disease is, however, most evident; and in this opinion he is supported by many high authorities in surgery.

As illustrative of the good effects of the proposed treatment, the two following cases are given:

Case 1.—A female servant, æt. 40, single, consulted me in the autumn of 1858, on account of a tumor in the left mamma, which had been observed to exist upwards of a year, and which was becoming painful, and was beginning seriously to affect her health.

September 16th, 1858.—The tumor was about the size of a nutmeg, irregular, movable, and of petrous hardness, having little sensibility, and little apparent connection with the surrounding parts. It occupied a space a little below the nipple, which was not contracted, nor was the skin puckered or discolored. The absorbent glands were unaffected; but the complexion was sallow and dusky; the appetite nearly gone, the nights were disturbed; and she complained of feeling "very weak and sinking." The alvine and uterine secretions were normal. A soft cushion of cotton wadding was placed under the whole breast, resting on a corset of ample size. She was directed to live well; to take every opportunity of exercise out of doors; and the chloride of arsenic and iron was exhibited thrice a day, in doses of twelve minims and a half of the solution of chloride of arsenic, and seven minims and a half of the tincture of sesquichloride of iron.

November 1st.—The pain was much relieved, and she had better nights; the appetite was improving, and the patient felt and looked better. The tumor was diminished in size. The treatment was continued.

January 25th, 1859.—She had no pain whatever. The tumor was still wasting. The health was improving. The bowels being inactive, a compound rhubarb pill was direct-

ed to be taken every night, and the arsenic and iron persisted in.

July 22d.—She had persevered most regularly in the treatment up to this time, and had had no pain whatever for several months. She looked well and plump, and had a good appetite. She considered herself quite well; but I advised her to persevere for at least another month, and to take especial care to use the cotton wadding as before.

This patient had been advised to have the tumor removed; but she strongly objected to the operation, and had resigned herself to despair. When I last saw her, her spirits were so good that I suppose no one could have convinced her that the tumor was malignant.

Case 2.—Miss —, æt. 24, residing on a healthy eminence in the country, had observed for several months a tumor on the right mamma, below and to the right of the nipple. She was a fine, handsome girl; and nothing but the extreme hardness of the tumor, coupled with failing health, could have convinced me that she was the subject of cancer.

The tumor was of the size of a bantam's egg, of oval figure, but irregular surface, very hard. The mamma was swollen and tender, the axillary glands were not sensibly enlarged, but very tender, and somewhat painful. The pain in the tumor was often intense and lancinating. The nipple was normal, the skin was slightly puckered over the tumor, which, although buried in a highly developed mamma, was in some degree adherent to the integuments. The health was considerably impaired. The bowels were very much constipated, and the catamenia very irregular, sometimes profuse and sometimes scanty. There was also severe leucorrhœa, with pelvic pains and general uterine distress; as well as a failing appetite and a coated tongue. The pulse was rapid and feeble. The patient had wasted considerably during the last three months, and her spirits were "wretched."

March 12th, 1858.—The breast was enveloped in a belladonna plaster, supported by cotton wadding and a sling. She was directed to regulate the bowels by pills of colocynth, aloes, and rhubarb; and to take the chlorides of iron and arsenic, as in the former case. She was ordered a full diet, with stout or porter; directed to take exercise in the open air, and encouraged to hope for a speedy amendment. In this she was not disappointed, for in less than a fortnight her health had considerably improved.

May 5th.—She was much more free from pain, and better every way in health and spirits. The leucorrhœa discharge was much reduced, the catamenia had become regular and normal. The tumor felt more loose and movable, and less irregular on its surface; and the puckering of the skin was less obvious. The pain and tenderness in the axilla were quite gone. She complained, however, of headache, and thought the iron did not agree with her. The arsenic and aperient pills were continued, without the iron; and the local treatment as before. Fowler's solution, in doses of four minims, was afterwards substituted for the chloride, which began to nauseate a little.

July 19th.—She was better every way, appetite good, was gaining flesh, and was in high spirits. The tumor was decidedly reduced in size, and almost free from pain. The treatment was continued.

From this period I saw nothing of the patient for five months; and, as I had never revealed to her the malignant character of the tumor, she expected she was recovering altogether. Accordingly, she visited some friends at a distance, neglecting her medicine, and took no need to the support of the breast.

December 12th.—The tumor was larger and more painful, the catamenia were too frequent, leucorrhœa was constant, and there had been a discharge of blood from the bowels, which were constipated. The appetite was fickle and capricious, the patient looked haggard and dejected. The arsenic, iron, and purgatives were ordered to be resumed.

I have not seen the patient since the last date, but the relapse of all the bad symptoms, on her neglecting the treatment, is quite as instructive as the benefit previously derived from it.

I am quite aware that it has been suggested by a microscopic pathologist of repute, whose name I forget, that inasmuch as a cancer is a parasitic growth, the application of warm coverings is objectionable, as tending to more rapid development and growth of the parasite; but few such facts as the above surely afford a sufficient refutation of this theory. Variations of temperature are great hindrances to healthy action in local disease of every kind; and besides that the cotton wadding serves as a soft cushion, it probably exercises a salulary influence by regulating the temperature of the parts.

On the Uterine Leucorrhœa of Old Women. By Dr. J. Matthews Duncan.

The object of the present paper is to aid in advancing our knowledge of leucorrhœa, by the description of a true uterine form of it, occurring in women who have for a more or less considerable period ceased to menstruate. This description is based on the observation of some cases that have occurred in Dr. Duncan's practice, and which have fortunately been so distinct in their characters, and so free from complications with disease of neighboring parts, as to afford almost typical examples of the affection.

The uterine leucorrhœa is, in the cases referred to, not symptomatic of any of the organic diseases of the uterus, such as fibrous tumor, or a complication of them; but, like the other primary leucorrhœ, is a disease of the genital mucous membrane; and, in this case, of that part of it lining the cavity of the womb.

This disease is not peculiar to women who have passed the childbearing period of life. Uterine leucorrhœa occurs in young women in various forms; but in old women it has appeared to the author to have more characteristic, and, perhaps, peculiar symptoms. Its treatment has also peculiarities; but above all, its diagnosis is important for two great reasons—first, that it may be appropriately treated; and, second, that the alarm sometimes excited in the patient, and sometimes in the practitioner, by the great similarity of the symptoms to those of cancer, the bane of women of mature years, may be subdued.

Discharge per vaginam of muco-purulent matter is a symptom of the disease. The discharge varies in character, being sometimes like mucus, and thin, sometimes purulent, and more or less viscid. It is occasionally mixed with blood, or only tinged with it. In some cases this sanguinolence is produced only by the head of the bed, or by anything coming in contact with the cervix uteri, especially if its mucous membrane happens to be abraded. If the discharge is retained in uteri, even for only several hours, it acquires a putrid odor. Its retention is apt to occur from the progressive atrophy of the neck of the womb leading to contraction of its canal. It may also, in some cases, be the result of flexion of the uterus; the influence of gravitation being then occasionally superaded to the dimensional contraction of the cervical canal at the seat of the flexion.

When the discharge does not flow freely, but accumulates in and distends the cavity of the uterus, it gives rise to a peculiar pain around the loins or pelvis, of a girding nature, as if a tight, hard cord partially or entirely encircled the person,—a pain having probably some remote analogy to the corresponding symptom produced when labor is obstructed by the distended hydrocephalic head pressing on the cervix uteri. Other pains may be present in the region of the uterus, or there may be irritation and pain of the vulva, from the constantly passing discharge; but these are not characteristic symptoms.

The only other notable symptom is disorder of the stomach and vomiting. When it occurs, it is evidently the result of what is called symptathy with, or the reflected action of, the uterine nerves irritated by a replete and tense uterine cavity.

The exact seat and nature of the disease requires for its diagnosis a careful physical examination. The more or less atrophied and tent-shaped fornix of the vagina is first felt, and at its apex the more or less atrophied crevix, with a patulous mouth. The body of the uterus generally stands high, and may be felt to be enlarged, generally, though not always, inconsiderably. A probe, passed into the patulous external os, soon finds that the internal os uteri is not in a similar condition. But having permeated it, the uterine cavity is found to be wide and capacious, the point of the probe moving preternaturally freely in it. When the probe passes without force, it causes almost no pain. It should be urged and handled with great care and gentleness; for, should the uterine walls have their toughness and elasticity destroyed by disease, whether simple or malignant, a probe may easily accidentally wound, or even transpierce them; and, while such a wound may be harmless in the case of healthy walls, its gaping condition, when made in an unelastic wall, will render it at least dangerous, and probably fatal.

If a small plug of sponge-tent be passed into the cervical canal, to dilate it for the free passage of the discharge, the latter will be restrained completely for the time, and the girding pain will be much increased. On the removal of the sponge, the discharge will come away fetid in a gush, and the girding pain will be completely relieved. Much care is necessary in using the sponge; for, if too large, it may lacerate the rigid atrophied cervix by its rapid expan-

sion; or, by too long obstruction of the discharge, the over-distended uterus may burst, especially if its walls are degenerated and unelastic; or, by the same cause, the noxious fluid may be forced through the tubes into the peritoneal cavity. These risks are over-above those rare evils which occasionally occur from the use of sponge-tents in cases that appear to be in every way proper for their application.

Examination with a speculum, adapted in size to the condition of the parts, may not be necessary. By its means an abraded condition of the cervix uteri may be remarked; and probably the process of the examination will cause blood to ooze from these parts.

The general aspect of cases of uterine leucorrhœa in old women appears to differ considerably from that of the young, although there is no single feature to distinguish them if the atrophy of age be omitted. This last condition implies a smooth vagina contracting in dimensions in its upper part, an elevated uterus, a small cervix,—states which are, of course, never observed in the young. But it will be found that in the old the disease is more chronic than in the young; that there is less pain and tenderness in the old than in the young; that in the old, thickened uterine walls and flexions or versions are rarer than in the young; that sanguinolence of the discharge is also rarer in the old than in the young; while fetor of it is more common, from a circumstance already mentioned, which leads to its more prolonged retention in utero. All these differences may not exist in any two cases that may come under a practioner's care; and even if they did, they would not be sufficient to establish any essential difference in the diseases; but they are of considerable importance nevertheless.

The treatment which has proved most successful in the hands of the author is one which is certainly not generally applicable to cases occurring in young women. It is the regular use of cauterization by nitrate of silver, applied every third or fourth day to the interior of the uterus, in Lallemand's port caustic. After each application the discharge is altered in character for a day, and subsequently diminished in quantity till it gradually disappears. Another remedy appeared to be of marked service, namely irrigation of the cervix uteri and vagina with water considerably below the temperature of the body. This is easily effected by a Higginson's syringe, a syphon, or some other suitable apparatus.

As the cure progresses, the dimensions of the cavity of the uterus are perceived, on introduction of the port caustic, to be gradually lessening, the atrophy of the cervix rapidly increases the external os uteri looses its potency, and at last the discharge entirely ceases to flow.

The disease being in itself not a fatal one, opportunities for *post-mortem* investigation can rarely occur. Dr. Duncan refers to the appearances observed in one aggravated and uncured case, where the patient died of dysentery, and where only a hurried autopsy was allowed. The uterine cavity was dilated, so that it might contain little less than half an ounce. The walls of the uterus were abnormally thin and soft, and the mucous membrane of the uterine cavity had an irregular and almost ragged surface, the depressions being apparently seats of ulceration.

Tannin as Antidote to Strychnine. By Professor Kurzac, of Vienna.

From want of a reliable antidote, the treatment in cases of poisoning by strychnine hitherto consisted principally in endeavoring to evacuate the poison, to combat the frightful spasmodic symptoms by narcotics, and to re-establish respiration, when it finally ceased, by artificial means. Donne proposed iodine, chlorine, and bromine, as antidotes to strychnine; Garrod, Rand, Morson, and Falck recommended prepared animal charcoal; but the efficacy of these substances has been neither tested sufficiently by experiment nor proved by experience. The same is true in regard to tannin, and the astringent vegetables containing it, their infusion, decoctions, etc. Although they recommended themselves by the fact that tannin forms chemical compounds, insoluble in water, with strychnine and other poisonous alkaloids, it seems very probable that these products might be re-dissolved in the stomach and intestines, and thus be rendered capable of absorption; the virtue of tannin as antidote to strychnine was, therefore, considered very doubtful.

With a view to subject this matter to a thorough examination, and to ascertain the efficacy of tannin in preventing and allaying the symptoms of poisoning by strychnine, Professor Kurzac made a series of experiments on rabbits and dogs. At the end of his interesting and highly impor-

tant memoir, he states that the results of his own investigation permit him to draw the following conclusions:

1. Tannin, if administered in time, is an excellent chemical antidote to strychnine.

2. The doubt, whether the precipitate formed by tannin in a solution of strychnine, although insoluble in water, would not be redissolved by the gastric and intestinal juice, and the strychnine thus reobtains its poisonous properties, is solved by these experiments on rabbits and dogs in a complete and highly gratifying manner.

3. The successful results in dogs and rabbits justify the expectation that tannin would suspend the poisonous action of strychnine also in man, even in cases where the evacuation of the tannate of strychnine, formed in the stomach, could not be accomplished.

4. These experiments show that twenty to twenty-five times the quantity of tannin is required in order to suspend the poisonous action of the strychnine. In cases of poisoning it will be, however, advisable to administer a relatively larger proportion, as a part of the antidote will be absorbed by the usual contents of the stomach, particularly by gelatin.

5. As tannin has proved to be an antidote to nitrate of strychnia, which is much more soluble in water, there is so much greater reason to hope that it will be successful in poisoning by pure strychnia which dissolves in water with much difficulty.

6. The same successful result is to be expected from its administration in poisoning by the hard and tough nux vomica, which imparts the poison to acqueous fluids, but gradually and not very rapidly.

7. Tannin is a so much more valuable antidote in poisoning by strychnine, as galls in which it is contained can be readily procured, and thus be administered without much loss of time. They are easily reduced to a powder, which is given, mixed with water. Another advantage is obtained by the vomiting which it is liable to produce. In the mean time an infusion or decoction of powdered galls may be prepared.

On an average, Turkish galls contain fifty, and the Illyrian galls twenty per cent. of tannin. At least one drachm of the former and two drachms and a half of the latter, are therefore required to neutralize one grain of strychnine introduced into the stomach, but in general, especially if there

is vomiting, a much larger quantity should be administered.

8. Another readily obtained substance containing tannin is Chinese tea, the efficacy of which in poisoning by strychnine, is confirmed by our experiments. But these experiments (7 and 8) have also shown that, in a decoction of tea leaves, we cannot count upon the whole amount of tannin contained in them. In poisoning by a larger dose, it would therefore be necessary to administer so large an amount of green tea that the antidote itself might produce poisonous effects. One decigramme ($\frac{1}{3}$ grain) of nitrate of strychnine requires, as our experiments prove, ten drachms (600 grains, 40 teaspoonfuls) of green tea, which, according to Poligot's analysis, contain about fifteen grains of caffein. Tea is, therefore, applicable only in poisoning by smaller doses, but may otherwise be useful as adjuvant.

9. The efficacy of roasted coffee as chemical antidote to strychnine seemed to be much inferior. The amount of caffeo-tannic acid contained in coffee is, according to Payen, 3.5 to 5.0 per cent. But our experiments (9, 10, and 11) show that the decoction evidently contains a much smaller quantity of undecomposed tannic acid than this per centage would justify us in assuming. The decoction of 180 grains of roasted Cuba coffee (being adequate to 200 grains of the raw coffee, which should contain at least six grains of tannic acid) produced, according to the ninth experiment, merely a delay and diminution of the poisonous effect of 0.13 grains of nitrate of strychnine. In the tenth and eleventh experiments, 300 grains of raw coffee, which weighed, after roasting, 267 and 264 grains, and should have contained at least nine grains of tannic acid, had furnished a decoction which, as antidote to 0.13 grains of strychnine, was nearly inert, only delaying the appearance of the symptoms for a little while.

10. From unroasted coffee, so inconsiderable an amount of tannin is extracted, by boiling, that the employment of its decoction for our purpose is out of question.

11. Oak bark (of Quercus robur and Q. pedunculata) contains, according to Gerber, 8.5 per cent. of tannic acid, and imparts it readily to aqueous fluids. It deserves attention in poisoning by strychnine so much the more, as it can be procured without much delay, especially in the country. What has been said about the administration of galls equally applies to the use of the powder and decoction of this bark.

12. On account of their frequent occurrence and the large amount of tannin they contain, we have to mention in this connection: acorns (from Quercus robur and Q. pedunculata) with 9 per cent; the bark of the horse-chesnut, with 8 per cent; willow bark, with 5½ per cent; and the green hull of walnuts. The radix tormentillæ, with 17 per cent.; rad. caryophyllatæ, with 31 per cent; and rad. bistortæ, are still richer in tannin, but can rarely be procured without much loss of time.

13. The solubility of the precipitate, produced by tannin in a solution of strychnine, by acetic, citric, and tartric acid, (vide experiments with the same,) show the necessity of avoiding vegetable acids during the treatment of poisoning by strychnine with tannic acid.

14. The same applies to the internal use of alcohol and alcoholic remedies.

15. The reported experiments on rabbits have sufficiently proved that more active voluntary movements excite the spasms usually produced by strychnia, even when they otherwise would not have made their appearance. In treating cases of poisoning by strychnine, it is therefore highly important *to prohibit, as much as possible, all voluntary movements, and to avoid violent excitement of any other kind.—Zeitschrift der K. K. Gesellschaft der Aerzte zu Wien, March* 12, 1860.

On the Use of Larch Bark in Pulmonary Hemorrhage. By Dr. Owen Daly, Physician to the Hull General Infirmary.

The experience of Dr. Daly agrees with that of Dr. Frezill (who recently introduced the medicine to the notice of the profession), Dr. Moore, Dr. Hardy, Dr. Kennedy, Dr. Carmichael, and some other Dublin physicians. "I believe," says Dr. Daly, "the tincture of larch will be found to be a most valuable agent in arresting and restraining pulmonary hemorrhage. It possesses powerful astringent properties, combined with the styptic and slightly stimulating qualities of a terebinthinate—a rare combination, and one which appears to me to present all the requisites for a perfect styptic. By virtue of these properties, it acts as a mild tonic, improving and strengthening the digestive organs, while it does not interfere with the healthy and natural action of the bowels. Further, it is a palatable and pleasant medicine, having an agreeable balsamic '*pinic*'

flavor, which is no slight recommendation in medicines of this class, especially when their continued exhibition must be persevered in for a lengthened period."

Dr. Hardy has given larch bark in fifteen cases of pulmonary hemorrhage, some passive and some active, in one case of severe epistaxis, and in one case of chronic cystitis, and in all cases with positive advantage, except in the last.

Case 1.—On the 3d of August, I was asked to visit an unmarried lady, æt. 25, who had been suffering for several days from passive pulmonary hemorrhage; she had hurried respiration and frequent cough, attended with expectoration of blood. She had had hæmoptysis on two previous occasions; both lungs were diseased, the left extensively, the disease having advanced to the formation of pulmonary excavations. The finger-ends were much clubbed. Lead and opium were first prescribed, afterwards sulphuric acid; finding, however, after persevering in the use of each for several days, that the hæmoptysis still continued without any abatement, and that she was becoming weaker, the tincture of larch was substituted for the acid, and was given in half-drachm doses every third hour. Two days after, the hæmoptysis had almost ceased, the sputa being only occasionally tinged with blood. The tincture was omitted for a few days on two occasions, and on each the expectoration became slightly tinged with blood; which, on the medicine being resumed, soon subsided. Latterly she has taken the tincture along with the infusion of chinchona.

Case 2.—The following case I saw in consultation with my friend Mr. Dix on the 31st of July. The patient was a married man, æt. 28; active hemorrhage had existed for a week. The blood coughed up was pure and unmixed. The hæmoptysis occurring every day or every other day, sometimes twice in the day, and on one occasion three times, but never lasting for more than a few minutes at a time; on one occasion at least four ounces of pure blood were coughed up. The constitutional disturbance was very slight, the pulse rarely exceeding eighty; the cough was very trifling more—to use his own expression—a "piffling" than a cough. The hemorrhage was always superseded by a "spongy feeling" referred to a particular spot in the right side of the chest, whence the effusion evidently proceded. In this case an excellent opportunity was afforded for testing the virtues of the tincture of larch as a styptic, inasmuch as, previous to its employment, lead and opium, gal-

lic acid, the mineral acids and turpentine, had all been administered, and each persevered in for two or three days without giving any relief. On the 4th of August, the tincture of larch was prescribed in drachm doses every two or three hours, given in water. The result was most satisfactory. The hemorrhage, after the administration of a few doses, was completely arrested, and although nearly four months have elapsed, no return of the bleeding has taken place. The dose was gradually diminished, and after a time quinine was added to the prescription.

Case 3.—The last case I propose relating is one of severe epistaxis occurring in a girl, æt. 19. She stated that for several weeks past she had suffered from profuse bleeding from the nose, generally commencing in the evening, and on more than one occasion she had become quite faint from loss of blood. The bleeding was not vicarious, as she had menstruated quite regularly; her appearance was anæmic and indicative of great loss of blood. Steel and quinine in combination with sulphuric acid were prescribed and taken for a fortnight without the least benefit. The tincture of larch was therefore substituted in half-drahm doses every fourth hour. The bleeding was completely arrested at the end of a week; she, however, continued to take the tincture in infusion of cinchona for some weeks longer; and when last seen, on the 10th September, was very much improved in her general health. It would be not only tedious, but unnecessary, to take up more time by a relation of further cases; the refrain in each would be the same, an immediate and striking improvement in the patient's condition, the hæmoptysis in every instance yielding to the medicine, in some cases after a few doses, in others after a more prolonged exhibition.—*Medical Times and Gazette.*

Pathology of Tubercle. By O. C. Gibbs, M. D., Frewsburg. New York.

In the *American Journal of Medical Science*, for April, Dr. C. Ellis, of Boston, has an essay upon *Tubercle.* The essay received the Boylston prize, and though the opinions of the author are none of them novel, yet the essay is not without its merit. We shall make a quotation or two, which will embody the most important ideas. Of *tubercle* he says; "It is not a specific exudation. It does not exist as such in the

blood. The yellow variety is always the result of metamorphosis—of degeneration." It is altogether probable that it is owing to a "degraded condition of the nutritive material," which differs from that furnished under ordinary circumstances, "not in kind, but in degree of vitality or capacity for organization."

In regard to its connection with inflammation, he says: "Tubercle makes its appearance sometimes with, sometimes without inflammation, and, certainly, the recent granulations, in most cases, show no signs of an inflammatory origin; the tissue in this neighborhood is remarkably healthy. If, therefore, they generally or often exist without apparent inflammation, the presence of the latter should rather be regarded as a consequence and not a cause." We quote the above opinions with pleasure, as they conform with our own idea, expressed several years since.

Those of our readers who have been in receipt of the Monthly for the last five years, may remember some remarks of ours in the January issue of this journal for 1856. Speaking of meningeal tuberculosis, we held the following language: "Many have supposed that meningeal inflammation commenced anterior to the deposition of meningeal tubercle. Such suppose the granular deposition to be nothing more or less than the product of inflammation, and, consequently, tuberculosis the sequence of an inflammatory cause. Some of the first names in the profession, in the full light of our present pathology, have maintained this opinion, of whom may be mentioned Broussais, Alison, Andral, Rainhart, Rokitansky, Gross, &c. Williams, too, claims that tubercles are frequently the product of inflammation. The subject is of the first importance, and I propose here a few arguments in disproof of the opinion of the above mentioned pathologists. Perhaps there is no fact better established in pathology than that tubercles exist in numberless cases without any evidence of inflammation, either by symptoms, or as shown by anatomical examination. If this be so, then inflammation is not necessary to the production of tubercle; and when it exists in connection with such deposits, it is probable that it is a superinduced consequence, and not a pre-existing cause. It is admitted that tubercles may occur in an organ simultaneous with, or subsequent to, inflammation in the same organ; but even then there is no evidence that there is an existing relation of cause and effect; but it is probable that their coexistence is accidental,

or, rather, the subjoined tubercles are an independent coincidence. It is possible that, in persons of a scrofulous diathesis, inflammation may *hasten* the deposition of tubercles; but this is far from justifying the conclusion that such deposits are the *products* of inflammation."

Bearing upon some other points of Dr. Ellis' paper, we should be happy to quote similar ideas from our paper referred to, but our space will not justify great extension.—We will, however, make one other quotation. Dr. Ellis states his conclusions in regard to tubercle thus: '"It is altogether probable that owing to a 'degraded condition of the nutritive material,' which differs from that furnished under ordinary circumstances, not in kind, but in degree of vitality, or capacity for organization."' (The double quoted are his.) This is the prominent idea of Dr. Ellis' prize essay, and now let us see if the idea is altogether new. In our paper previously referred to, and published in 1856, we made the following remark: "It is probable that fibrin, or a substance that is fibrin-like, may result from a retrograde condition of albumen. And it is my opinion, though that opinion may be hastily formed, that this fibrin-like substance, resulting from defective albumen, that has failed in its object in the process of nutrition, is the pabulum of tuberculosis. In other words, "the albuminous material which in the process of nutrition is to form the elements of growth and repair, through some defect in its formative process, is, to a limited extent, incapable of cellular development; and this non-developmental albuminous product becomes the dead, fibrin-like concretion which is denominated tubercle." We fail to perceive the difference between the prize essay opinions of Dr. Ellis, and those expressed by ourself, in an unpretending article, nearly five years ago.

While upon the subject of tubercle, we wish to pay a passing notice to articles in the *Medical and Surgical Reporter*. In the issue of that Journal for April 21st, under the head of "A New Theory of Phthisis," reference is made to a work just issued in London by Dr. Goodwin Tims, and to his opinion that tubercle is the product of "destructive assimilation," retained in the system because of imperfect excretion. In the *Reporter* for May 12th, Dr. E. J. Fountain, of Davenport, Iowa, complains that credit is erroneously given, and affirms that *he* first enunciated this opinion, in the July issue of the *N. Y. Journal of Medicine*. That Dr. Fountain believes his statement true, we will not doubt, but it is, never-

theless, slightly incorrect. Several pathologists, and among them we think we may mention Andral and Gavarret, have considered tubercle only modified fibrin. Because so considered, Simon called it *fibriniform*. Though fibrin was once considered the material from which textures were chiefly nourished, yet, for several years back, several eminent physiologists have regarded fibrin only an excrementitious product. Both the above ideas were fully brought out in our article, to which reference has previously been made, and they do not differ from those advanced by Drs. Tims and Fountain.

On the Pythology of Lead-Colic. By Willouchby F. Wade, M. B., Physician to the Queen's Hospital and to the General Dispensary; Professor of the Practice of Physic in the Queen's College, Birmingham.

The received opinion that this painful disorder depends upon some perverted action of the colon, as its name implies, has already had its antagonists. When we come to inquire a little more closely what the perverted action is, we find that no satisfactory answer can be given. Some contend for an empty and contracted condition of the gut, others for a distension by gas or fæces.

Dr. Copeland says that in his cases distension was as frequent as retraction, owing evidently to inflation and fæcal engorgement of the colon, the course of which could be distinctly traced under the abdominal parietes. De Haen and Merat found contraction of the colon and cæcum in all the cases they examined. But, as Dr. Watson judiciously remarks, "with regard to the contraction of the large intestine in these cases, we must not be two ready to attribute it to spasm, for the bowel, when empty, is apt to be contracted." Andral details six cases in which no such contractions were found. Indeed, Andral, Louis, and Sir George Baker, concur in describing the intestines as being normal throughout their whole extent. I doubt very much whether an unopposed contraction of a hollow muscular canal can be attended with pain. It is the vain endeavor to shorten the muscular tissue, and the resistence offered by an imcompressible material, that causes the pain in biliary calculus and ordinary crapulous or flatulent colic. An empty intestine might, I think, go on contracting till its calibre was obliterated before it produced pain, The after-

pains of labor do not offer any necessary objection to this view; for the contraction of one layer of fibres can be well resisted by the large mass of inactive ones. Besides, they often depend on the presence of clots. On the other hand, did the pain of lead-colic depend upon the presence of flatus, I cannot conceive how it is that this should not, in such cases, be readily removed, for a time at least, by opiates and carminatives, as happens in ordinary flatulence. If, again, it depended upon retained fæces, the removal of them should remove the pain. But the operation of the bowels is by no means necessarily followed by this relief. It is, indeed, true that the two often coincide, but this is quite as easily explicable in another way, as we shall see directly. The retraction of the abdominal parietes, so constantly noticed in this form of the complaint, is by no means so constantly observed in other varieties of colic.

The pathology of lead-colic is then, I submit, unsatisfactory and vague as at present taught.

Various pathologists of distinction have been disposed to refer the symptoms to cramp of the external abdominal muscles, instead of the intestines at all. Giacomini first broached this notion and M. Briquet of la Charite has more lately revived this view, which he supports with skill and vigor. The existence of cramp in these muscles has been recognized by those who are entirely committed to the generally accepted pathology. Thus Dr. Copeland says, "the voluntary muscles often become so sore that they cannot bear the slightest pressure; and the pain frequently alternates between the stomach and bowels and the external muscles." Besides the spamodic contraction of the abdominal muscles, which he has observed more particularly in the severe cases, Grisolle says that three-fourths of these patients suffer from cramps, or a feeling of numbness, or from lancinating and tearing pain in the muscles of the lower extremities; half of them have similar affections of the muscles of the upper extremities, and a third in the lumbar muscles.

The fact that in most severe cases the abdomen was found to be retracted is important; for there was evidently a spasm of all the abdominal muscle. Hence, on Briquet's theory, the acuteness of the pain; whereas in the slighter cases there would be only a moderate spasm or perhaps affection of one or two muscles only, which would not produce retraction and which might be readily overlooked unless attention were specially directed to it.

There can be no question that this condition is more than sufficient to produce any amount of pain—even the excruciating agony of lead-colic. To any one who has suffered from cramp in the leg or any other part of the body, further proof of this point is quite superfluous. That such is the actual cause of the suffering M. Briquet shows by the following arguments:

Muscles which are thus affected may be excited to more energetic action by rubbing them with the point of the finger or with any rigid, bluntly pointed instrument, such for example, as a penholder. They can also be re-excited if they have previously become quiescent. We can thus reproduce or exacerbate the pains of lead-colic, and this artificial excitement cannot be distinguished by the patient from the natural exacerbations so common in this complaint.

Some little time ago I had an opportunity of proving the truth of M. Briquet's assertions.

A boy, aged 13, who was engaged in polishing black glass brooches with a powder containing lead, and whose gums were marked with the blue line, was brought in great suffering to the Dispensary, in October, 1858. The pain was constant, with paroxysmal exacerbations; it was referred to the upper part of the abdomen; the bowels had been open two days before, but for a week had been very costive. The pain, also, was of a week's duration. The upper half of each rectus abdominis was tonically contracted and the spasm evidently increased during each exacerbation. The spasm might be artificially excited by manipulation with the finger, as described by Briquet. This produced just as much pain as occurred during the inartificial exacerbations, and this pain was just of the same character as that which came on spontaneously. In this case the bowels were moved, not before, but after the pain had ceased. In another less severe case, in a girl, the pain ceased twenty-four hours before the bowels were opened.

There can be, I think, no difficulty in understanding that the pains of lead-colic, and the retraction of the abdomen, may be completely explained by the existence of tonic and clonic spasm of the abdominal muscular parietes. The question then which remains to be answered is, whether it is possible for the constipation to depend upon this spasm. It appears to me that this question may be safely answered in the affirmative.

In ordinary defecations these muscles take an active part. "The act of defecation (as of urination)," says Dr. Carpenter, "chiefly depends upon the combined contraction of the abdominal muscles, similar to that which is concerned in the expiratory movement; but the glottis being closed, so as to prevent the upward motion of the diaphragm their force acts only on the contents of the abdominal cavity; and so long as the sphincter of the cardia remains closed, it must press downwards upon the walls of the rectum and bladder, the contents of the one or the other of the cavities, or of both, being expelled according to the condition of their respective sphincters; these actions being doubtless assisted by the contraction of the walls of the rectum and bladder themselves."

The muscles, then, of the abdomen being already firmly contracted without closure of the glottis, the diaphragm is unable to descend, and pressure upon the rectum becomes impossible. This, combined with the hardened state of the fæces and the contraction of the sphincter ani, both of which are, according to the best authorities, common occurrences in lead-colic, are undoubtedly sufficient to explain the constipation which characterizes this disorder. The bladder requiring a less sustained voluntary effect is emptied; this applies also to the stomach. This theory explains also why micturition is sometimes painful; and the connections of the cremaster account for its spasmodic contraction and the consequent painful retraction of the testis. And we can also comprehend why the action of the bowels, and cessation of the pain, should be so commonly contemporaneous, and why, as in these cases I have cited, the pain should cease before the bowels are moved.

It now remains to consider in what relation the lead-poisoning stands to this spasm; and what relation there is between this latter and the disorder of the abdominal organs, which is certainly a common feature of the complaint, such as the slight icterus, the hardened fæces, the vomiting, loss of appetite, and so on.

I presume that the members of the Association are acquainted with the papers which have been published from time to time in our Journal, by our ingenious confrere, Dr. Inman, of Liverpool. In these and in a volume which he has published separately, Dr. Inman has contended that the symptoms which have been grouped together under the title of "Spinal Irritation," arises from the irregular con-

traction of muscles which have been enfeebled from any cause; as for instance over-exertion or malnutrition. He points out, too, that the term over-exertion, is a relative one; that whereas one person might walk fifty miles or lift enormous weights, others might evidently be overtasked did they accomplish a tenth part of such labors, Muscles so effected present, generally perhaps in a minor degree, those appearances and phenomena which are found in the abdominal muscles of patients with lead-colic.

Now, we know, from examination, that muscles impregnated with lead loose their colors and become enfeebled in various degrees, even to the extent of actual paralysis. The malnutrition, if extreme, ends in fatty degeneration so complete that all the proper functions of the muscles are rendered impossible. It is especially, if not exclusively, the voluntary muscles upon which lead exerts its morbid influence. I can assert that the abdominal muscles are impregnated with lead in these cases, because sufficient time has not elapsed since attention has been directed to this view to permit of the necessary investigations being completed. But if this be made an objection, I answer that it applies to the intestinal involuntary muscles, which have not been shown to suffer disorganization, but which on the contrary, have been stated by independent observers to be apparently healthy. Besides the frequency with which spasm does attack the external muscles has been admitted by the same observers.

Whether the absorption or ingestion of lead produces any direct effect upon the abdominal viscera, I am also unable to state; if not, we must attribute their disorder to general causes, such for instance, as intemperance in men, a vice to which painters are much addicted, and which we have the authority of Dr. Copland for stating, aggravates and reproduces the effects of lead upon the system. Induration of the fæces has a direct influence upon the production of parietal spasms, by necessary unwonted activity of the muscles during the act of defecation. The occupation of many of these people involves considerable exertion.

In a case of so-called spinal irritation, with costiveness, in a young girl, not a lead-worker, the act of defecation was always attended with pain in the abdominal muscles and a subsequent soreness in the upper portions of the recti abdominus. This ceased in a great degree when the bowels were rendered more soluble by medicine, and this long be-

fore there was any or much amelioration of the other muscles which were liable to these painful contractions.

Congestion of the liver, irritability of the stomach, and irritation of the colon, from scybala, may tend in another way to produce this spasmodic affection. It is not uncommon to find the muscles contracted where they overlie an internal organ which is in an abormal state; indeed, Dr. Copland explains this contraction by supposing that it is involuntarily instituted for the purpose of compressing the distended colon.

In conclusion, let me ask why should we seek to offer an explanation on lead-colic which cannot be substantiated, when we can find another one which is not only supported by admitted facts, but which is capable of adequately explaining not merely the colicky pain and the constipation, but also of embracing those, as they have been held minor and accidental features, the existence of which must on the old theory, have been explained in the very way which I now seek to extend, so as to embrace and harmonize all the phenomena of the disorder. Whether lead-colic, using the term in its strict acceptation, ever exists is, I think, extremely doubtful; but that many cases reputed to be such are to be referred to a totally different category, rests upon evidence which cannot, I think, be controverted. It therefore behooves those who are prepared to admit as, I think all must, the occasional simulation of lead-colic (in the strict sense) by a spasm of the external muscles; it behoves them, I say, to distinguish carefully in each case its exact nature, both with the view of ascertaining the real pathology of these two disorders, of regulating their treatment by this, and not merely by the name under which they have been hitherto confounded.—*Brit. Med. Jour.*

Urticaria as a Symptom of Irritation of the Female Sexual Organs. By Prof. Scanzoni.

Professor Scanzoni observes that although it has long been known that chronic affections of the female sexual organs are not infrequently accompanied by skin diseases (as urticaria, eczema, acne, psoriasis, chloasma, etc.,) the influence of a more sudden irritation of these organs upon the cutaneous surface is by no means so well established. He has been enabled to find no very definite statements upon the

subject, and this leads him to communicate some cases tending to establish such a consensus.

A lady, aged 35, had been under his care for sometime with slight retroflexion of the uterus and chronic metritis, when he ordered four leeches to be applied to the vaginal portion of the cervix uteri. This little operation had been already performed once before without any ill effect, but upon the present occasion, ten minutes after the application had been made, the patient was seized with violent febrile action, and slight delirium. In half an hour she was seen by the author, who found her skin, and especially that of the face and upper part of the body, almost of a scarlet red. The temperature of the surface was considerably raised, and her pulse beat 136. She continued much the same during the night, and when seen next day, the face, neck, chest, arms and thighs exhibited with the intense redness, innumerable urticaria elevations. In a day or two the exanthem had entirely disappeared, a distinct desquamation, however, taking place on the face and neck. As this was the first case the author had ever seen in which these symptoms followed the application of the leeches to the crevix, he did not believe in their dependence upon this, and again ordered them to be employed. Four times this was done without any unpleasant occurrence, but on the fifth occasion the whole series of symptoms above described were reproduced, and that so rapidly after the biting of the leeches that any doubt as to cause and effect could no longer be entertained.

In a second case, a woman, aged 28, was admitted into the Wiirzburg Midwiferv Institution on account of chronic uterine infarctus, and five leeches were ordered to be applied to the cervix. Scarcely had they taken hold, when she complained of the most violent labor-like pains in the abdomen, and although these soon moderated in force, they were accompanied with such intense febrile action that the entire body glowed with heat, the pulse rose to 140, the carotids pulsated visibly, and the face, neck and chest exhibited an intensely red color, to which were added in a very short time a large eruption of urticaria elevations of a palish color. The eruption was accompanied by great headache, inclination to vomit, and excessive lassitude, symptoms which continued to the following day, although the exanthem with the accompanying fever disappeared entirely after three hours' continuance. This patient often had

suffered from urticaria at the menstrual periods, without, however, its being accompanied by such violent symptoms.

The third case occurred in the person of a young lady, aged 26, who, on account of long-continued chronic oophoritis and metritis, required blood-letting. In the course of sixteen months four or five leeches had been applied eight times. On the ninth occasion, an intense redness covered the skin, and the patient complained of the most violent pain in the head. The temperature of the surface was much raised, and it was almost entirely covered with innumerable, minute, prominent, white elevations. In the course of an hour these appearances gradually subsided, the headache continuing for twenty-four hours longer. The author is aware of a fourth case of the same kind, but is unable to furnish the particulars.

Professor Scanzoni believes that these cases deserve the attention of those occupied with the diseases of women, as well as of dermatologists. They admit of no other explanation than the irritation of the uterine nerves, caused by the bite of the leeches, induced an entirely unusual, and in its mode of origin inexplicable, disturbance of the vascular system, which again, in a mode which is to us equally unintelligible, gave rise to the production of the eruption of urticaria. In proof that these appearances were not produced as a consequence of any poison being conveyed through the medium of the bite of the leech, it is to be observed that similar symptoms never result from the application of leeches to other regions of the body, while it is to be observed that even very slight irritation of the sexual organs, as that produced by examination with the finger or speculum, or by the application of caustic, will in many sensitive women give rise to erythema of the face, neck, breast, etc., which disappears as rapidly as it comes on.—*Wurzburg Medicin. Zeitschrifts*, band i. pp. 90—95.

Arsenic Poisoning and Arsenic Eating.—Arenic appears to be fast becoming an ubiquitous poison. Little children swallow it in their delecate green bon-bons; women encircle themselves with robes tinted with its beautiful hues, and waft danger around their lovely persons, *killing* their admirers literally as well as metaphysically; painters spread it over their canvas; paper-hangers captivate their customers with its charming colors. We can hardly turn without meeting this poison in some form or other.

When it was first announced that paper hangings colored green by arenite of copper were dangerous to health, the paper hangers took the alarm at the prospective damage to their trade, and secured the services of eminent chemists to look into the question of danger to life and health. These scientific gentlemen put green paper into test tubes, with and without currents of air, and found that no moderate heat, not even that of boiling water, was capable of volatilizing the arsenite of copper. They also looked into the question of putrefying paste, and found that its emanations passing through the paper did not give rise to the formation of arseniuretted dydrogen. They therefore concluded that as in none of these ways arsenic could be volatilized, it was perfectly fixed, could not mix with the air of the apartment, and therefore, that the green paper was entirely innocuous.

Strange to say, in all their speculations, these learned gentlemen entirely overlooked the humble but potent agency of Bridget. When that high domestic functionary, intent upon cleanliness and the extermination of spiders, enters an apartment armed with her irresistable brush, she sweeps from the surface of the paper the imperfectly adherent green powder, which from its extreme fineness floats in the atmosphere of the room, and when it does settle on book, and chair, and carpet, is so easily raised that it may be considered to be constantly present in the air when any one is moving about the room. In this way it gets access to the lungs and other air-passages, and even through the saliva to the digestive organs. Thus a slow poisoning is set up, which manifests itself by the usual symptoms. The fact that such poisoning does take place has been established by a great mass of concurrent testimony so pointed and direct that it is impossible to doubt it,

Shortly before public attention had been drawn to this matter of the paper hangings, some curious statements had been made relative to the innocuousness of this very poison in constitutions accustomed to its use. In all these cases the poison was eaten habitually. So remarkable a statement gained extensive currency and was alternately doubted and believed. At last a counter statement was made, the whole story was ridiculed, and it was settled that Styrians could no more eat arsenic with impunity than other people. The matter was believed by many to be finally ret at rest, and Styrian arsenic eating was credited to the general account of traveler's tales.

Recently, however, Mr. Charles Heisch, lecturer on chemistry at the Middlesex Hospital, has published in the Pharmaceutical Journal a paper on this subject, which we copy.

It will be observed that he believes the original statement about the arsenic eating, and cites authorities to prove it.—Among other interesting points in the article, we call attention to the greater danger of inhalation over the introduction of the poison into the stomach.

Poisoning by Strychnia—Analysis of the Viscera. By Henry Osborn, M. R. C. P. London, Physician to the Southampton Dispensary.

Prior to the discovery of Marshe's test for the detection of minute quantities of arsenic in organic mixtures, many cases of arsenical poisoning, probably, occurred which were never brought to light; but whether cases of poisoning by strychnia have been overlooked for want of a delicate process for its extraction, or whether errors in diagnosis occurred, I cannot venture to assert. It is possible, however, that there was a greater difficulty in procuring strychnia by the public formerly than now.

A few months since a case of poisoning by strychnia occurred in this town, and Mr. Lawrence, who was called in, made a correct diagnosis of the case, as it ultimately proved to be by the result of the analysis which I was requested by that gentleman to undertake.

Mr. Lawrence kindly invited me to the post-mortem examination which he performed, and we placed in three jars, the stomach with its contents, a portion of the small intestines, including the duodenum, and a portion of the liver. By keeping the parts separate from each other we prevented the possibility of transferring any portion of the poison from one part to another. On opening the stomach about eight ounces of fluid, mixed with a quantity of partly digested food, was present. The mucous membrane of the stomach presented no appearance of congestion, as is usually observed when death takes place after a full meal, but it exhibited a pale color, except at the pylorus, which was congested.

In conducting the analysis I was kindly assisted by Mr. Lawrence, and proceeded at once to search for strychnia (a). One half of the contents of the stomach and the organ itself were submitted to the chloroform process, as recommended by Messrs. Rogers and Girdwood, using sulphuric acid for the solvent. The duodenum and its contents were submitted to the same process, using hydrochloric acid for the solvent; but

(a.) A small bottle (without a label) was found after death, containing strychnia.

so much coloring matter was taken up by the acids, that a further process was necessary ere the strychnia could be obtained sufficiently pure for the application of the color tests. Owing to the difficulty and time occupied in getting rid of the organic matter, I used acetic acid for the solvent for the other half of the stomach and its contents; also for the liver, substituting ether and potash for ammonia, as recommended by Dr. Letheby, when the strychnia was obtained at once in a state of purity for the application of the color tests.

After washing the potash solution with ether it was treated with chloroform, and the strychnia obtained equally pure by that solvent, thus showing the superiority of acetic acid over the two former acids, at least in the case under consideration; and I trust the observation affords a sufficient excuse for publishing the process which I found to be the most direct for obtaining a satisfactory result.

It may be necessary to state that in the alcohoile stage of the process we were surprised to find the extract only slightly bitter to the taste (a small quantity only being applied to the tongue), and in order to prove whether the strychnia was taken up by the sulphuric and hydrochloric acids, we resolved upon trying its effects upon animals For this purpose a kitten was procured, and a small quantity of the fluid extract (deprived of spirit) administered. The first symptom observed was that the hair of the animal stood on end, and within the space of about an hour it died, with all the symptoms of poisoning by strychnia. It may be remembered that Dr. Marshall Hall suggested a physiological test for the detection of strychnia, and although Mr. Lawrence expressed his satisfaction at the result of the colour tests, he suggested the advisability of trying the strychnia, which I had extracted in a pure state, on a frog; a small quantity being administered, well marked tetanic symptoms were produced.

On the Use of Sarsaparilla in Syphilitic Diseases. By Professor Sigmund, of Vienna (Zeitchrift der Gesellschaft der Aerzte zu Wten, January 2d, 1860.)

Professor Sigmund proposed to himself to examine the properties of sarsaparilla when used alone, and for this purpose he selected the best sarsaparilla root, and administered a portion of a freshly-made and strong decoction to the patients every day, their diet at the same time being carefully regulated. The only remarkable effect of the drug was a moderate

excitement of diuresis, and occasionally a slight discharge from the bowels (which might perhaps be attributed to other causes), but no other disturbance of any organ or function could be discovered. The patients were from eighteen to forty years of age, were kept quiet in bed, at a uniform temperature, and were free from scrofulous or other wasting disease. The sarsaparilla was administered both in the primary and secondary forms of syphilitic disease, and the following is an abstract of the results; 1. In simple recent gonorrhœa: seven cases exhibited a cure in no case, nor was any of them made worse; but the symptoms diminished as they would have done under any ordinary expectant treatment. 2. In chronic gleet, induced by swelling of the prostrate gland and consecutive catarrh of the bladder: four cases exhibited no result whatever. 3. In simple primary syphilitic sores: nine cases were observed. The local treatment consisted in daily clensing the sores, cauterization with nitrate of silver, or sulphate of copper, or corrosive sublimate, and dressings with weak solutions of the latter salt. The disappearance of the discharge, and the formation of a clean suppurating surface and gradual cicatrization, followed in six cases in precisely the same manner and at the same period as they would have done in the absence of all internal treatment. 4. In indura ted sores, the existence of which had not dated beyond five weeks: there were 14 cases, and the local treatment consisted of daily clensing, and dressings containing white or red precipitate, or iodine with iodide of potassium. There was a slow formation of scars, like flat, hard nodes, while the glands in the vicinity, as well as those at a greater distance, became hard and swoolen, and in nine cases the treatment spots developed themselves on the skin. 5. In papular syphilitic eruptions, scattered over the skin: four cases, which had been subjected to no medical treatment, were now treated continuously for thirty days, during which the original papules continued, and others more numerous were produced; here and there one of them shrivelled up and formed little scales upon cuticle, and larger ones followed after. 6. In papular syphilitic eruptions, grouped in circles or discs: four cases had been previously treated with idoide of potassium for five or six weeks, and they were now treated for thirty days without any result. 7 In secondary ulcers of the skin and in periostitis, the use of sarsaparilla appeared to produce no effect in addition to that which might be attributed to local treatment with mercury or iodine.

Thus it seemed established that sarsaparilla, used by itself,

does not exercise the slightest perceptible influence on the course and termination of syphilitic diseases, and Dr. Sigmund therefore ceases entirely to employ it alone in any form of syphilis.

Cases treated with German drinks, in which sarsaparilla is made to enter as an essential constituent, gave the following results, in the hands of Dr. Sigmund. The preparation employed was Zittmann's decoction, prepared according to the Prussian pharmacopœia.

1. In secondary syphilis, the cases which had not been treated at all previously, exhibited no deviation from the ordinary course as long as the decoction alone was employed; upwards of a hundred such cases were observed. More than half of the patients bore the purgative effects very badly, and suffered from constant sleeplessness and obstinate discharge from the intestines, while some actually became emaciated.

2. In secondary syphilis, which had been previously treated by mercury or iodine, or both combined, but without success, and in which the cases presented relapses, papular or pustular eruptions, squamous affections, ulcers of the skin and mucous membrane, disease of bones, &c.; in such cases, the use of the decoction alone generally diminished the symptoms, and its continued administration in certain instances effected a cure. In all such cases, copious discharges from the intestines and bladder and abundant prespiration were the immediate results of the treatment, and whenever these results failed to ensue, the cure was not effected. Since sarsaparilla, employed alone, does not produce the effects just described, the inference is, that the results must be attributed to the other ingredients present in the decoction, and therefore the sarsaparilla was omitted and a decoction prepared from the other constituents, and this latter afforded the same result under the same circumstances, even when the sarsaparilla was quite pure, and not mixed, as is often the case, with bardana, astragalus, inula, &c. The decoction of Zittmann is well known to contain a considerable quantity of antimony and mercury, and the operation of this preparation is accounted for by the presence of these minerals.

The conclusion to be drawn from the above cases is, that the use of sarsaparilla alone in ganorrhœal discharges, and in primary and secondary forms of syphilis, effects no material change, and that the activity of the decoctions which contain sarsaparilla cannot be referred to that root as one of their essential constituents.

On the Use of Raw Meat as a Remedy. By F. P. Leverett, M. D. (Charlestown Medical Journal and Review, March, 1860.)

The use of raw meat as a remedy, first recommended by Wiesse, of St. Petersburg, has been followed by remarkable success in American practice. In 1855, Dr. Caspar Morris introduced the use of raw beef into the chileren's ward of the Philadelphia Hospital; and the patients soon took it with readiness, if not avidity, and with great benefit. The mode of administration was to take a fillet of beef, as free from fat as possible, and scraped with a knife, being thus reduced to a pulp; this was generally seasoned with salt, and sometimes with sugar. A teaspoonful of the pulp was first given three or four times a day, and then gradually augmented as the child's fondness for it increased. The first cases in which the raw meat was given were those of two little children who had been much reduced by a long-neglected intermittant fever, followed by obstinate diarrhœa. Under the use of the raw meat they soon began to improve, and in less than a fortnight they were convalescent. Another case was that of a child, two years old, suffering from hereditary syphilis, and reduced to the most emaciated condition. Raw beef and brandy were administered, and in a week there was a change for the better, so that it was possible to administer idoide of potassium for the constitutional affection; and in two or three months the patient had quite recovered. Raw meat was given not only to children, but also to adults with great benefit. One was the case of a man suffering from chronic diarrhœa, who took the raw meat, and in less than two months he was cured. In 1856 Dr. Leverett administered the raw beef in a number of cases at a hospital in Philadelphia, and often met with marked success. He found that it could be rendered palatable to adults, if sprinkled with salt and allspice, and spread on a thin slice of bread, or between two slices as a sandwich. In one case of chronic dyspepsia, with great irritability of the stomach, it was retained when almost everything else was rejected; and in the latter stages of typhoid fever it proved a valuable article of diet. Dr. Leverett thinks that the value of raw meat as a remedy lies in its being highly nutricious, easily digested and assimilated, and capable of being efficaciously administered in a small dose, one or two mouthfuls being enough for a meal.

EDITORIAL AND MISCELLANEOUS.

End of the Sixteenth Volume of the Southern Medical and Surgical Journal.

A year of indefatigable labor brings us to the end of another volume. We have endeavored to make each number a fair representative of the current literature of the profession, and to crowd its pages to the full, with the most practical and useful matter for the benefit of our readers. A few matters of medical news have escaped us, much medical gossip we have omitted, while all which savored of medical scandal we have purposely excluded. We have endeavored to keep the work as purely scientific as possible, and during the coming volume we hope still to pursue the same, as we regard it, becoming course. To both, readers and correspondents, we return our sincere thanks for their assistance and encouragement during the present year, and earnestly ask that they will continue to cheer us with their helping approval during the toil and labor of another volume.

What they think of American Diplomas Abroad.—An American medical contemporary states that the ease with which charters are now obtained from State Legislatures, for every nondescript association of men, whether for proper or improper purposes, has effectually broken down all safeguards to respectability, and thrown the field of medicine widely open to every species of adventurer. Charters are granted by State Legislatures to any and every body of men, for any and every conceivable purpose, without discretion or reserve. At nearly every session a batch of medical institutions are chartered, embracing every shade of quackery: and these, equally with the respectable and legitimate schools of medicine, are entitled to confer the degrees of M D., and to represent themselves abroad as universities. It is difficult to imagine a more deplorable state of confusion than such reckless State patronage of ignorance and quackery must produce. Already it threatens to disorganize the educational system of the profession in America; for adventurers are thus freely enabled to purchase that academical status which only education can confer in other countries. The inevitable result must be, that since we have no means of distinguishing here, amongst the multitude of American colleges, those which apply the necessary tests to their members from those which admit the most unworthy persons, American diplomas will fall into discredit, and will be regarded as one of no value.—*Dublin Medical Press.*

On the Employment of Santonine in Amaurosis—By M. Martini.—(*Comtes Rendus*, No. xi. March, 1860.)—M. Martini, in 1858, communicated a paper to the Academie des Sciences on the effects which santonine exerts upon the coloration of the vision and the urine. In the present communication, containing additional observations upon the same subject by himself and others, he gives an account of the results of his employment of santonine in ocular neuroses. Only three cases are referred to, the most meagre details being given: 1. A woman, seventy years of age, had suffered for some time with defective vision of the left eye, when M. Martini saw her in March, 1859. The pupil was but slightly sensible to light, and was larger than that of the right eye. A slight white cloud was perceived in the aqueous humor, and the patient could scarcely distinguish light. On March 10th, the santonine was commenced, with from four to six grains being given, (how often is not stated,) and on the 15th the patient perceived, several times in the day, objects of a greenish-yellow color, and that even with the bad eye. On the 18th eight grains were given, and the patient began to be able to recognize the countenances of the bystanders. By the 22d objects were observed to be colored yellow, and had become still more plainly distinguishable. The employment of the santonine having been now discontinued, the improvement remained stationary. 2. The santonine having been administered from March 20th to 22d, to a patient amaurotic in both eyes, the retina became much more sensible to the action of light. 3. To a man who suffered from amaurosis of the left eye, being already deprived of the right one, ten grains of santonine *per diem* were given. In a week's time he was enabled to read some large letters written on a wall.—*Philadelphia Med. & Surg. Reporter.*

Ventilation of Rooms at Night.—An extraordinary fallacy is the dread of night air. What air can we breathe at night but night air? The choice is between pure night air from without and foul night air from within. Most people prefer the latter. An unaccountable choice. What will they say if it is proved to be true, that fully one-half of all the diseases we suffer from, is occasioned by people sleeping with their windows shut? An open window most nights in the year can never hurt any one. In great cities night air is often the best and purest air to be had in the twenty-four hours. I could better understand in town shutting the windows during the day than during the night, for the sake of the sick. The absence of smoke, the quiet, all tend to making night the best time for airing patients. One of our highest medical authorities on consumption and climate has told me that the air of London is never so good as after ten o'clock at night.—*Florence Nightingale.*

Chloride of Zinc Moulded into Sticks for the purpose of Cauterization.—Soften gutta-percha in boiling alcohol, and incorporate it with finely pulverized chloride of lime in a warm porcelain mortar, taking equal parts of each. Then roll rapidly on a porphyry slab, to the diameter of a quill, and divide in fragments, each of which shall be pointed at one end. Keep these in a wide-mouthed bottle in powdered

lime. These sticks remain perfectly hard, are easily handled, cauterize with great regularity, and act as a sponge through which the chloride will slowly exude, becoming liquid by the action of the air and the skin.—*Lancet.*

Iodide of Propylamine.—According to M. Benjamin J. Crew, in the American Journal of Pharmacy, for September, propylamine combines readily with the aid of a gentle heat with iodine, and forms a colorless solution in which the characteristic odor of these two substances can be perceived. It may be prepared by adding iodine to a convenient quantity of propylamine in a glass flask over a sand bath as long as the iodine is taken up; a deep red solution is first formed, which, as the combination is effected, becomes gradually colorless; in case of an excess of iodine, a small addition of propylamine will speedily take it up. M. Crew suggests that the iodide of propylamine might be found to answer better in certain cases than the chloride. He proposes the following formula: *R.* Iodide of propylamine, 25 drops; peppermint water, 6 f. oz.; sugar, 2 drams. Dose—A table-spoonful every two hours. In this form the patient would receive the 1-16th grain of iodine at a dose.

Treatment of Gleet.—Every one knows how tiresome and difficult to cure a gleet may become, and how weary of each other both patient and surgeon occasionally grow in consequence. A little "dodge." which may not yet have crossed the Channel, and which I have seen succeed here, when the whole armament of balsamics, injections, and derivatives had failed, is the following: Take a moderate-sized wax bougie (the common yellow wax ones are the best,) warm it slightly, and then roll it for a few seconds in well-powdered alum; when thoroughly whitened with the salt, roll it between the hands so as to press the alum well into the wax, and the instrument is ready for use. Make the patient micturate previously, and then pass your bougie, without the assistance of oil or cerate, as far as may be deemed advisable, cutting it off to within an inch of the orifice of the meatus, where it may be tied or not, and left for one hour each day. In this way a tiresome and refractory old gleet may be cured in ten days.—*Lancet, July* 8, 1860.

Chloroform in Scabies.—Professor Bock, in *Schmidt's Jahrsbuch*, for August, states that the external application of chloroform is useful in some cases of itch. This substance appears to kill the insect, and moreover, by producing anæsthesia, it relieves the irritability of the skin. M. Bock has never observed any inconvenience to arise from the use of chloroform; and the sensation of burning, which it produces for a short time, is quite trifling in comparison with the intolerable itching caused by the disease.—*Chemist and Druggist.*

Lotion for Mentagra.—M. Richard has recently called attention to the good effects which he has seen from the application, in patients affected with mentagra, of a lotion composed of sulphate of zinc and

sulphate of copper in distilled water. After the employment of ordinary remedies, and when the affected part is cleansed from the crusts which cover it, the lotion is applied frequently; and under this treatment it has been found that the disease disappears in a comparatively short period.—*Br. Am. Jour.*

British and Foreign Medico-Chirurgical Review.—We learn that Dr. Sieveking, who has for several years very ably conducted this journal, is about to retire form the editorship.

Iodohydrate of Ammonia in Constitutional Syphilis.—Prof. Gamberini deduces the following conclusions from fourteen cases:—1. Iodide of ammonia and the iodohydrate of ammonia are indicated in the same cases of syphilitic diseases as the iodide of potas. 2. The treatment from the employment of this remedy in increasing doses from 10 to 80 centigrammes daily, in from 100 to 180 grammes of some liquid, has lasted from 14 to 35 days, averaging 21 days. 3. A sensation of burning or heat in the throat and stomach of some patients forced us to suspend temporarily the iodide, as well as to lessen the dose. 4. A liniment, composed of the same remedy, with olive oil, 15 centigrammes of the former, and 30 centigrammes of the latter, has assisted in curing the osteocopic pains, 5. Syphilitic accidents cured by iodide of ammonia have been cases of arthralgia, rheumatic neuralgia, periostosis, ganglionic enlargements of the groins and neck, and a papulo-vesicular eruption of the back. The process of making this medicine is very simple. It is that of Ruspini, consisting in precipitating a solution of the iodide of iron by carbonate of ammonia, filtering the solution, which is then to be evaporated promptly, until a pellicle is formed..and then crystallize. This salt crystallizes in cubes, and is very soluble in water. Its taste is not very disagreeable, being a little more bitter than iodide of potas.—*Bolletino delle Scienza Medica: L'Union Medicale de la Gironde.*

Phthisis in Hysterical Subjects—M. Beau, in a clinical lecture, given on the 4th of August, at La Charite, spoke of the rare occurrence of phthisis in hysterical subjects. The cases which suggested his remarks were those of two females of middle age, at the present moment under treatment in his wards, both presenting the symptoms of the suppurative stage of consumption, and both having within a very recent period manifested unequivacal indications of hysteria. The coincidence of the two affections, he said, was rare—so rare, indeed, as to have led to the belief that the presence of the latter exercised a protective influence in the constitution antagonistic to the development of turbercle.—The same immunity from phthisis had been observed in persons suffering from asthma and emphysema of the lungs. But this also, was a general and not an invariable rule; and M. Beau expressed himself as onfident that neither of these morbid conditions could be considered as compatible with the tubercular diathesis; their coexistence was the exception, and not the rule, but quite sufficed to prove that hysteria possessed no power in preserving the patient from phthisis.—*Lancet,*