allow a variation of 5.6 per cent. in either direction, or from − 3.6 to + 7.6 per cent., which renders the observation comparatively valueless. If, on the other hand, the number of the blind were 500,000, and those out of this number whose blindness was caused by smallpox were 2 per cent., or 10,000, the limits of error would only be 0.00056 in either direction, or 0.056 of one per cent., leaving a variation of 9,720 to 10,280 only.

Errors from Incomparability of Data.—The data to be compared should be strictly of a comparable nature. The conclusion that a certain remedy is valuable in the treatment of some definite diseases is not demonstrated by the fact that the fatality in a series of cases thus treated is six per cent., while in another series treated without this remedy it is twelve per cent., unless it is shown that the ages and other previous conditions of the patients in the two cases are not widely different, and unless the numbers constituting the series are sufficiently great to avoid the fallacy due to paucity of data.

Errors from the Composition of Rates.—These are among the most common of all statistical errors, and show the fallacy of dealing with average rates by any shorter method than that of dealing with the sums of the numbers to be compared.

For example, the death rate of Boston in the census year 1900 was 20.81 per one thousand. That of Chelsea was 19.02, of Revere 14.14, and of Winthrop 7.59.

If these death rates are averaged as follows:

$$\begin{array}{r} 20.81 \\ 19.02 \\ 14.14 \\ 7.59 \\ \hline 4)61.56 \\ \hline 15.39 \end{array}$$

the resulting death rate of these four municipalities (Suffolk County) is 15.39, and very many instances are to be found in which this erroneous method is employed.

The only correct method of obtaining the combined death rate is as follows:

Cities and towns.	Populations.	Deaths, 1900.
Boston	560,892	11,671
Chelsea	34,072	648
Revere	10,395	147
Winthrop	6,058	46
	611,417	12,512

Therefore $\frac{12,512 \times 1,000}{611,417} = 20.46$, the true death rate of the County.

The error arises from the fact that the largest city in the group is given, in the first calculation, only as much prominence in obtaining the result as each of the others, namely, one-fourth of the whole, whereas its population constitutes over ninety-three per cent. of the whole.

Errors from Stating Deaths as a Ratio of the Total Deaths.—There is nothing erroneous *per se* in stating the deaths at any age as a percentage of the total number of deaths, or the deaths from any special cause as a percentage of the deaths from all causes. It is a useful and, in fact, the only method practicable when it becomes necessary to state the proportion of one of these to the other. But beyond this such method cannot be trusted. For example, the proportion of fatal accidents in Massachusetts, in 1900, among boys under five years of age was 14.5 per cent. of all fatal accidents among males, and that of girls of the same age was 24.3 of all fatal accidents of females. From these figures, however, it cannot be inferred that girls are more liable to fatal accidents than boys, since the contrary is the fact, the actual numbers being 205 such deaths among boys under five, and 126 among girls. The only reasonable conclusion is that at higher ages females are much less subject to fatal accidents than males. When stated as a ratio of the living population of the same ages, the deaths by accident of boys under five were fourteen per ten thousand, and those of girls of the same age were only nine per ten thousand.

Life Tables.—The usefulness of life tables is twofold. They constitute the basis of life insurance, and serve as an index of the sanitary condition of the community out of whose data they are constructed.

Life tables differ for the same group of population from year to year, and they also differ when calculated from the statistics of different portions of a group of inhabitants, as, for example, those of a large city, compared with those of any of the outlying districts beyond its borders.

The work of constructing a life-table for any American State or city is necessarily less satisfactory in its results than the work of making a similar table for any of the civilized nations or communities of Europe, since most foreign populations are more stationary than those of America.

The essential data for constructing a life-table are the number, ages, and sexes of the living, and the same data for the dying.

1. Theoretically, the best method of constructing a life-table would be to observe a large number of children, all born on the same day, through life, entering in a column (headed l_x) the number who remain alive at the end of each successive year, until all have died; and in a second colume (d_x) the number dying before the completion of each year of life. Therefore, d_x represents the number out of l_x persons, attaining the precise age x, who die before reaching the age $x + 1$. Therefore $d_x = l_x - l_x + 1$, and the number dying between the ages x and $x + 1$ is equal to the difference between the numbers living at the ages x and $x + 1$. It is not practicable to observe a body of children throughout life in this manner, so that other methods must be adopted.

2. It is not necessary to assume, as in the preceding case, that all the persons have been born on the same day. If we could trace a large number of children throughout life, without reference to the dates of birth, a life-table could be constructed, if the number of the living and dying in each year of life were known.

The great life insurance companies employ a method somewhat similiar to this, in which tables are constructed from the results of watching a large number of insured lives from the time of insurance to death. These, however, differ from the general population, in that they are selected lives, among whom unfavorable risks are weeded out by medical examination. The result of this process does not, however, present such striking differences from the general population as might at first sight be expected.

3. The common method of constructing a life table consists in taking the experience of several years and comparing the numbers of deaths of persons at different ages with the living at the same ages as determined by the census. For example, in the United States, and especially in States where reliable registration of births and deaths is made, the results of the decennial census enumerations may be employed together with the deaths occurring in the intervening years. By this means the disturbing effect of an epidemic year may be minimized. By this method results are obtained which, being wholly based upon recent observations, are more correct than if a million persons were observed from birth to death; since in the latter case the conditions which determined the rate of mortality might, before the whole series became available, have undergone very great changes, which for practical purposes would render the table valueless.

Dr. Farr's English life table No. 3 was based upon the registered deaths in England during the seventeen years 1838–54, and on the two census enumerations of 1841 and 1851. Many other life tables of English cities and districts have been made since that time and were constructed upon similar principles.

The life table constructed by the writer upon the experience of the population of Massachusetts was based upon the deaths which occurred in the five years 1893–

97, and upon the State census of 1895, the middle year of this period.

There are certain conditions which affect the accuracy of life tables, and particularly American life tables, which may be enumerated as follows:

1. *The Influence of Migration.*—The increase or decrease in the population depends upon two factors, migration and the difference between the numbers of births and deaths. In many of the States the gain by immigration is much greater than the gain by natural increase of births over deaths. Moreover, the increase by immigration is not uniform from year to year, nor is it equally distributed at the different age periods, fully one-half of the immigrants being between fifteen and thirty years of age, while the numbers at the extremes of life are comparatively small.

2. *Defects of the Census.*—Mr. H. Gannett, in a paper contributed to the American Statistical Association (Publications, vol. iv., p. 99) estimates a "shortage in the census of 1890 of negro children of about a quarter of a million," and of native white children "about the same." If this be correct, the entire shortage in the total population, including that of foreign whites, must leave a million unaccounted for in the United States. In States with complete registration it is possible to supply the deficiency for the first four or five years of life with a reasonable degree of accuracy from the registered births.

3. *The Practice of Incorrectly Reporting the Ages of the Living and the Dead.*—This error is of two kinds: (*a*) Greater numbers of persons are reported at the even ages, 20, 30, 40, etc. (both living and dead) than at 19, 21, 29, 31, etc., in consequence of the common habit of using round numbers instead of accurate ages. This may be partly eliminated by employing the periods 25–35, 35–45, etc., instead of 20–30, 30–40, etc. (*b*) The habit especially among unmarried females of understating the ages of the living. This appears to a greater or less degree to be a common practice in all countries where census enumerations are taken.

4. *Defects in Birth and Death Registration.*—These defects depend upon the want of thoroughness with which the laws relating to birth and death registration are executed, and also upon the efficiency of such laws to secure the desired results. In some of the older States the birth and death returns are undoubtedly collected with a reasonable degree of completeness, and in such States life tables may be made from the returns of the whole population.

The following statement by Newsholme in the chapter on vital statistics in his "Hygiene and Public Health" presents in a condensed manner the general principles involved in the construction of a life table:

"It is usual to start with 1,000,000 or 100,000 children at birth and to make a separate table for the proportionate number of males and females at birth. Thus in Brighton in 1881–90 these were in the proportion of 51,195 × 48,805. Starting with 51,195 male infants at birth, and multiplying this number by .84608, the probability of surviving one year, we obtain 51,195 × .84608

BRIGHTON LIFE TABLE, MALES.

(Based on the mortality of the ten years 1881–90.)

Age. x.	Dying in each year of life. d_x.	Born, and surviving at each age. l_x.	Sum of the number living, or years of life lived at each age, $x + 1$, and upward to the last age in the table. $\Sigma l_x + 1$.	Mean after life time (expectation of life) at each age. $e_x°$.
0	7.880	51,195	2,206,174	43.59
1	2,863	43,315	2,162,859	50.43
2	996	40,452	2,122,407	52.96
3	733	39 456	2,082,951	53.29
4	440	33,723	2,044,228	53.29
..	....	......	....	....
..	....	......	....	....
97	12	29	43	1.60
98	7	17	26	1.53
99	4	10	16	1.48

= 43,315. For the second year of life the probability of surviving was .93398; hence the number of survivors is 43,315 × .93398 = 40,452, etc. The general arrangement is shown in the preceding example of a life table, which only presents the data at or near the two extremes of life, the intermediate figures having been omitted from considerations of space.

The 43,315 males surviving to the end of the first year of life out of 51,195 born will each have lived a complete year in the first year, or among them 43,315 years. Similarly the 40,452 males will live among them 40,452 further complete years, and so on, until all the males started with become extinct at age 105. Evidently, therefore, the total number of complete years lived by the 51,195 males started with at birth will be 43,315 + 40,452 + 39,456 + 38,723 + . . . + 10 + 6 + 4 + 3 + 2 + 1 = 2,206,174 years, this sum being obtained by adding together the numbers living at each age beyond the age in question down to its last item. This number of years is lived by 51,195 males. Hence the number of complete years lived by (*i.e.*, the expectation of life of) each male $= \frac{2,206,174}{51,195} = 43.09$ years. This is termed the *curtate expectation of life.* It deals only with the complete years of life, not taking into account that portion of life time lived by each person in the year of his death, which may be assumed to be, on an average, half a year. Hence the complete expectation of life according to the above table is 43.59 years.

The materials for the construction of a life table are illustrated in the following table, from which the Massachusetts Life Table (1893–97), published in the Thirtieth Annual Report of the State Board of Health for 1898, was constructed:

POPULATION OF MASSACHUSETTS, 1885, AND DEATHS, 1893–97.

Age periods.	POPULATION, 1895.			DEATHS, 1893–97.		
	Total.	Males.	Females.	Total.	Males.	Females.
0 to 5	*235,647	*118,453	*117,194	78,779	42,710	36,069
5 to 10	224,119	112,296	111,823	6,730	3,345	3,385
10 to 15	202,900	101,574	101,326	3,460	1,655	1,805
15 to 20	225,881	110,565	115,316	6,305	2,899	3,406
20 to 25	265,983	123,692	142,291	9,982	4,899	5,083
25 to 35	465,943	227,630	238,313	20,148	10,103	10,045
35 to 45	341,535	168,997	172,538	18,832	9,610	9,222
45 to 55	245 586	118,417	127,169	19,377	9,895	9,482
55 to 65	157,651	72,766	84,885	22,334	11,278	11,056
65 to 75	90,088	41,040	49,048	25,561	12,694	12,867
75 to 85	35,405	15,460	19,945	20,547	9,675	10,872
85 to 95	6,123	2,180	3,943	7,105	2,713	4,392
Over 95	308	77	231	559	152	407
Age unknown	3,014	1,554	1,460	496	378	118
Total	2,500,183	1,214,701	1,285,482	......	......	......

* The population figures in this line (0–5) were not used in the construction of the life table, but the figures employed were estimated from the registered births and the deaths under five years of age.

In the English life tables it has been customary to estimate the population at the middle of a given year for life-table purposes, the census being taken on April 1st. In Massachusetts the census has usually been taken so near the middle of the year (about June 1st), that the slight error arising from the difference between this date and the middle of the year may practically be disregarded.

The deaths in any year are distributed throughout the year, and it is plain that the deaths registered at any age x will not have occurred at the precise age x, but some will have just attained that age, and others will have been close upon $x + 1$. Now it is assumed that these deaths at age x occur at equal intervals throughout the ensuing year, an assumption which is approximately correct except for the first two years of life. It is therefore customary to distribute the deaths in the first year of life by months, and then to calculate the mean from this distribution.

Massachusetts Life Table.

(Based on the Mortality of the Five Years 1893–97.)

Table No. 1.—Males.						*Table No. 2.—Females.*					
Age.	Dying in each year of age.	Born and surviving at each age.	Population or years of life lived in each year of age.	Years of life lived in and above each year of age.	Expectation of life at each year of age.	Age.	Dying in each year of age.	Born and surviving at each age.	Population or years of life lived in each year of age.	Years of life lived in and above each year of age.	Expectation of life at each year of age.
x.	d_x.	l_x.	P_x.	Q_x.	E_x.	x.	d_x.	l_x.	P_x.	Q_x.	E_x.
0	8,849	51,350	46,343	2,263,907	44.09	0	7,151	48,650	43,907	2,267,469	46.61
1	1,794	42,501	41,604	2,217,564	52.18	1	1,662	41,499	40,668	2,223,562	53.58
2	818	40,707	40,298	2,175,960	53.48	2	763	39,837	39,455	2,182,894	54.79
3	559	39,889	39,609	2,135,662	53.54	3	544	39,074	38,802	2,143,439	54.83
4	424	39,330	39,118	2,096,053	53.29	4	385	38,530	38,337	2,104,637	54.62
5	316	33,906	38,748	2,056,935	52.87	5	318	38,145	37,986	2,066,300	54.17
6	252	38 590	38,464	2,018,187	52.30	6	250	37,827	37,702	2,028,314	53.62
7	205	38,338	38,235	1,979,723	51.64	7	206	37,577	37,474	1,990,612	52.97
8	170	38,133	38,048	1,941,488	50.91	8	170	37,371	37,286	1,953,138	52.26
9	146	37 963	37,890	1,903,440	50.14	9	147	37,201	37,127	1,915,852	51.50
10	123	37,817	37,755	1,865,550	49.33	10	129	37,054	36,990	1,878,725	50.70
11	110	37,694	37,639	1,827,795	48.49	11	113	36,925	36,868	1,841,735	49.88
12	104	37,584	37,532	1,790,156	47.63	12	113	36,812	36,755	1,804,867	49.03
13	111	37,480	37,424	1,752,624	46.76	13	123	36,699	36,637	1,768,112	48.18
14	135	37,369	37,301	1,715,209	45.90	14	146	36,576	36,503	1,731,475	47.34
15	159	37,234	37,154	1,677,899	45.06	15	172	36,430	36,344	1,694,972	46.53
16	181	37,075	36,984	1,640,745	44.26	16	195	36,258	36,160	1,658,628	45.74
17	195	36,894	36,796	1,603,761	43.47	17	206	36,063	35,960	1,622,468	44.99
18	211	36,699	36,593	1,566,965	42.70	18	218	35,857	35,748	1,586,508	44.24
19	226	36,488	36,375	1,530,372	41.94	19	230	35,639	35,524	1,550,760	43.51
20	241	36,262	36,141	1,493,997	41.20	20	241	35,409	35,288	1,515,236	42.79
21	255	36,021	35,893	1,457,856	40.47	21	251	35,168	35,042	1,479,948	42.08
22	268	35,766	35,632	1,421,963	39.76	22	255	34,917	34,790	1,444,906	41.38
23	280	35,498	35,358	1,386,331	39.05	23	261	34,662	34,531	1,410,116	40.68
24	289	35,218	35,073	1,350,973	38.36	24	265	34,401	34,268	1,375,585	39.99
25	296	34,829	34,781	1,315,900	37.67	25	269	34,136	34,001	1,341,317	39.29
26	301	34,633	34,482	1,281,119	36.99	26	274	33,867	33,730	1,307,316	38.60
27	305	34,332	34,179	1,246,637	36.31	27	278	33,593	33,454	1,273,586	37.91
28	309	34,027	33,872	1,212,458	35.63	28	282	33,315	33,174	1,240,132	37.22
29	313	33,718	33,560	1,178,586	34.95	29	286	33,033	32,890	1,206,958	36.54
30	316	33,403	33,245	1,145,026	34.28	30	290	32,747	32,602	1,174,068	35.85
31	318	33,087	32,928	1,111,781	33.60	31	294	32,457	32,310	1,141,466	35.17
32	319	32,769	32,609	1,078,853	32.92	32	297	32,163	32,014	1,109,156	34.48
33	319	32,450	32,290	1,046,244	32.24	33	301	31,866	31,715	1,077,142	33.80
34	320	32,131	31,971	1,013,954	31.56	34	302	31,565	31,414	1,045,427	33.12
35	322	31,811	31,650	981,983	30.87	35	306	31,263	31,110	1,014,013	32.43
36	325	31,489	31,326	950,333	30.18	36	308	30,957	30,803	982,903	31.75
37	328	31,164	31,000	919,007	29.49	37	312	30,649	30,493	952,100	31.06
38	331	30,836	30,670	888,007	28.79	38	315	30,337	30,180	921,607	30.38
39	334	30.505	30,338	857,337	28.10	39	318	30,022	29,863	891,427	29.69
40	337	30,171	30,002	836,999	27.41	40	320	29,704	29,544	861,564	29.00
41	341	29,834	29,662	796,997	26.72	41	324	29,384	29,222	832,020	28.31
42	346	29,493	29,320	767,334	26.02	42	326	29,060	28,897	802,798	27.62
43	352	29,147	28,971	738,014	25.32	43	329	28,734	28,570	773,901	26.93
44	359	28,795	28,615	709,043	24.62	44	332	28,405	28,239	745,331	26.24
45	368	28,436	28,252	680,428	23.93	45	335	28,073	27,905	717,092	25.54
46	379	28,068	27,878	652,176	23.24	46	346	27,738	27,565	689,187	24.85
47	393	27,689	27,492	624,298	22.55	47	354	27,392	27,215	661,622	24.15
48	410	27,296	27,091	596,806	21.86	48	367	27,038	26,854	634,407	23.46
49	429	26,886	26,671	569,715	21.19	49	379	26,671	26,481	607,553	22.78
50	448	26,457	26,233	543,044	20.58	50	395	26,292	26,094	581,072	22.10
51	466	26,009	25,776	516,811	19.87	51	410	25,897	25,692	554,978	21.43
52	483	25,543	25,301	491,035	19.22	52	423	25,487	25,275	529,286	20.77
53	502	25,060	24,809	465,734	18.58	53	437	25,064	24,845	504,011	20.11
54	520	24,558	24,298	440,925	17.95	54	457	24,627	24,398	479,166	19.46
55	539	24,038	23,768	416,627	17.33	55	476	24,170	23,932	454,768	18.81
56	561	23,499	23,218	392,859	16.72	56	494	23,694	23,447	430,836	18.18
57	585	22,938	22,645	369,641	16.11	57	512	23,200	22,944	407,389	17.56
58	608	22,353	22,049	346,996	15.52	58	530	22,688	22,423	384,445	16.95
59	636	21,745	21,427	324,947	14.94	59	550	22,158	21,883	362,022	16.34
60	659	21,109	20,780	303,520	14.38	60	572	21,608	21,322	340,139	15.74
61	677	20,450	20,111	282,740	13.83	61	588	21,036	20,742	318,817	15.16
62	691	19,773	19,427	262,629	13.28	62	606	20,448	20,145	298,075	14.58
63	709	19,082	18,727	243,202	12.75	63	625	19,842	19,530	277,930	14.01
64	729	18,373	18,008	224,475	12.22	64	644	19,217	18,895	258,490	13.45
65	748	17,644	17,270	206,467	11.70	65	665	18,573	18,240	239,505	12.90
66	769	16,896	16,511	189,197	11.20	66	689	17,908	17,563	221,265	12.36
67	789	16,127	15,732	172,686	10.71	67	715	17,219	16,861	203,702	11.83
68	810	15,338	14,933	156,954	10.23	68	743	16,504	16,132	186,841	11.32
69	827	14,528	14,114	142,021	9.78	69	771	15,761	15,375	170,709	10.83
70	840	13,701	13,281	127,907	9.34	70	793	14,990	14,593	155,334	10.36
71	845	12,861	12,438	114,626	8.91	71	800	14,197	13,792	140,741	9.91
72	847	12,016	11,592	102,188	8.50	72	821	13,388	12,977	126,949	9.48
73	842	11,169	10,748	90,596	8.11	73	825	12,567	12,154	113,972	9.07
74	831	10,327	9,911	79,848	7.73	74	824	11,742	11,330	101,818	8.67
75	816	9,496	9,088	69,937	7.36	75	818	10,918	10,509	90,488	8.29
76	794	8,680	8,283	60,849	7.01	76	806	10,100	9,697	79,979	7.92
77	769	7,886	7,501	52,566	6.67	77	790	9,294	8,899	70,282	7.56
78	741	7,117	6,746	45,065	6.33	78	768	8,504	8,120	61,383	7.22
79	707	6,376	6,022	38,319	6.01	79	742	7,736	7,365	53,263	6.89
80	672	5,669	5,333	32,297	5.70	80	711	6,994	6,638	45,898	6.66
81	632	4,997	4,683	26,964	5.40	81	678	6,283	5,944	39,260	6.25
82	590	4,365	4,070	22,281	5.10	82	640	5,605	5,285	33,316	5.94
83	465	3,775	3,502	18,211	4.82	83	600	4,965	4,665	28,031	5.65
84	499	3,229	2,980	14,709	4.56	84	559	4,365	4,085	23,366	5.65
85	452	2,730	2,504	11,729	4.30	85	518	3,806	3,547	19,281	5.07

Massachusetts Life Table.—*Continued.*

Table No. 1.—Males.						*Table No. 2.—Females.*					
Age.	Dying in each year of age.	Born and surviving at each age.	Population or years of life lived in each year of age.	Years of life lived in and above each year of age.	Expectation of life at each year of age.	Age.	Dying in each year of age.	Born and surviving at each age.	Population or years of life lived in each year of age.	Years of life lived in and above each year of age.	Expectation of life at each year of age.
x.	d_x.	l_x.	P_x.	Q_x.	E_x.	x.	d_x.	l_x.	P_x.	Q_x.	E_x.
86	402	2,278	2,072	9,225	4.05	86	476	3,288	3,050	15,734	4.79
87	353	1,876	1,700	7,153	3.81	87	434	2,812	2,595	12,684	4.51
88	307	1,523	1,370	5,453	3.58	88	333	2,378	2,181	10,089	4.33
89	263	1,216	1,084	4,083	3.36	89	351	1,985	1,810	7,908	3.98
90	220	953	843	2,999	3.15	90	310	1,634	1,479	6,098	3.73
91	181	733	642	2,156	2.94	91	270	1,324	1,189	4,619	3.49
92	146	552	479	1,514	2.74	92	232	1,054	938	3,430	3.25
93	116	406	348	1,035	2.55	93	194	822	725	2,492	3.03
94	88	290	246	687	2.37	94	160	628	548	1,767	2.81
95	66	202	169	441	2.18	95	129	468	403	1,219	2.60
96	48	136	112	272	2.00	96	100	339	289	816	2.41
97	33	88	71	160	1.82	97	77	239	200	527	2.20
98	23	55	43	89	1.62	98	55	162	134	327	2.02
99	15	32	24	46	1.44	99	40	107	87	193	1.80
100	9	17	13	22	1.29	100	27	67	53	106	1.58

Massachusetts Life Table.

Table No. 3.

(Based on the Mortality of the Five Years 1893–97.)

Age. x.	m_x. Annual Mortality per Unit at Each Year of Age.		p_x. Probability of Living One Year from Each Age.		Age. x.	m_x. Annual Mortality per Unit at Each Year of Age.		p_x. Probability of Living One Year from Each Age.	
	Males.	Females.	Males.	Females.		Males.	Females.	Males.	Females.
0	0.19095	0.16287	0.82569	0.84939	51	0.01808	0.01596	0.98208	0.98417
1	.04313	.04087	.95778	.95995	52	.01909	.01674	.98109	.98340
2	.02030	.01933	.97990	.98085	53	.02023	.01759	.97997	.98256
3	.01411	.01403	.98599	.98607	54	.02140	.01873	.97888	.98144
4	.01084	.01004	.98922	.99001	55	.02268	.01989	.97758	.98031
5	.00815	.00835	.99188	.99168	56	.02416	.02107	.97613	.97915
6	.00655	.00663	.99347	.99339	57	.02533	.02231	.97450	.97793
7	.00536	.00550	.99464	.99452	58	.02757	.02364	.97280	.97664
8	.00447	.00456	.99556	.99546	59	.02968	.02513	.97075	.97518
9	.00386	.00396	.99616	.99606	60	.03171	.02683	.96878	.97353
10	.00326	.00349	.99675	.99652	61	.03366	.02835	.96689	.97205
11	.00292	.00306	.99709	.99695	62	.03557	.03008	.96505	.97037
12	.00277	.00307	.99722	.99693	63	.03786	.03200	.96285	.96850
13	.00297	.00336	.99703	.99665	64	.04048	.03408	.96032	.96648
14	.00362	.00400	.99640	.99601	65	.04331	.03646	.95761	.96419
15	.00428	.00473	.99573	.99528	66	.04657	.03923	.95449	.96152
16	.00489	.00539	.99511	.99464	67	.05015	.04241	.95107	.95848
17	.00530	.00373	.99471	.99429	68	.05424	.04606	.94719	.95498
18	.00577	.00610	.99425	.99392	69	.05859	.05015	.94307	.95108
19	.00621	.00647	.99381	.99356	70	.06325	.05434	.93869	.94710
20	.00667	.00683	.99335	.99320	71	.06794	.05866	.93430	.94301
21	.00710	.00716	.99292	.99286	72	.07307	.06327	.92951	.93867
22	.00752	.00733	.99251	.99268	73	.07834	.06788	.92466	.93435
23	.00792	.00756	.99212	.99249	74	.08385	.07273	.91953	.92983
24	.00824	.00773	.99179	.99230	75	.08979	.07784	.91407	.92508
25	.00851	.00791	.99153	.99212	76	.09586	.08312	.90852	.92020
26	.00873	.00812	.99131	.99192	77	.10252	.08877	.90248	.91500
27	.00892	.00831	.99112	.99170	78	.10984	.09458	.89588	.90969
28	.00912	.00850	.99092	.99154	79	.11740	.10075	.88911	.90408
29	.00933	.00870	.99072	.99134	80	.12601	.10711	.88146	.89834
30	.00950	.00890	.99054	.99114	81	.13496	.11406	.87357	.89209
31	.00966	.00910	.99039	.99094	82	.14496	.12110	.86483	.88581
32	.00978	.00928	.99026	.99077	83	.15591	.12862	.85536	.87915
33	.00988	.00949	.99017	.99055	84	.16745	.13684	.84549	.87192
34	.01001	.00961	.99004	.99043	85	.18051	.14604	.83440	.86390
35	.01017	.00984	.98988	.99021	86	.19402	.15607	.82314	.85523
36	.01037	.01000	.98968	.99005	87	.20765	.16724	.81188	.84567
37	.01058	.01023	.98948	.98982	88	.22409	.18019	.79850	.83470
38	.01079	.01044	.98927	.98962	89	.24271	.19392	.78356	.82322
39	.01101	.01063	.98905	.98942	90	.26097	.20960	.76915	.81028
40	.01123	.01083	.98881	.98923	91	.28193	.22708	.75290	.79607
41	.01150	.01109	.98857	.98897	92	.30480	.24733	.73551	.77989
42	.01180	.01128	.98827	.98878	93	.33333	.26759	.71430	.76399
43	.01215	.01152	.98792	.98855	94	.35772	.29197	.69655	.74522
44	.01255	.01176	.98753	.98831	95	.39053	.32010	.67324	.72406
45	.01302	.01200	.98706	.98802	96	.42857	.34602	.64706	.70502
46	.01359	.01255	.98650	.98753	97	.46479	.38500	.62286	.67715
47	.01430	.01301	.98581	.98708	98	.53488	.41045	.57798	.65944
48	.01513	.01367	.98498	.98643	99	.62500	.45977	.52381	.62617
49	.01608	.01431	.98404	.98579	100	.69230	.50943	.48572	.59399
50	.01708	.01514	.98307	.98498					

One hundred thousand infants, followed through their first year of life (in the period 1893–97) in Massachusetts, yielded 90,250 years of life. To obtain this mean of the infants living throughout the first year, the following method was employed:

All of the deaths of infants under one month old which occurred in the years 1893–97 were tabulated from the mortality returns in the office of the secretary of state, also those of infants who died in the second and the third months of life separately, then those of infants who died in the three succeeding months of life (fourth to sixth) in one group, and then those who died in the succeeding six months in another group. From these data, and from the births registered in the five years ending with June 30th, 1897, the figures for the first year of life were calculated after the method shown by Dr. Farr in his life table No. 3, page xxiii.

The foregoing mean, 90,250 (46,343 males and 43,907 females) (the arithmetical mean of the series l_0, $l_{\frac{1}{12}}$, $l_{\frac{2}{12}}$, . . . l_1), is used as the first term of column P (see foregoing table, p. 260). All of the succeeding terms in the column for the years 1, 2, 3, 4, etc., are the means of the terms in the preceding column l_x, using the formula,

$$P_x = \frac{l_x + l_{x+1}}{2}.$$

In these tables Column x presents the ages from birth up to one hundred years.

Column d_x presents the numbers of those dying in each age of life.

Column l_x, Table 1, presents the survivors out of 51,350 males at birth at each age of life. (The females were 48,650, which added to the number of males makes 100,000.)

Column P_x presents the population maintained by the numbers in column l_x, beginning with 46,343 males (and 43,907 females), in all 90,250 persons.

Column Q_x shows the aggregate number of years which the persons at each age in the table will live, until their extinction by death.

Column $E_x = \frac{Q_x}{l_x}$ is the mean future life time of the persons living at each age in the table, the expectation of life.

In the third table, the mortality column presents the mortality per unit of the population at each age of life, the figures being obtained by dividing the deaths at each age by population at such ages, the proper corrections and interpolations having been made, either by the analytical method described by Dr. Farr in his English Life Table, No. 3, p. xxv., or by the less accurate method known as the graphic method described by Mr. George King in the *Journal of the Institute of Actuaries* (October, 1883) and in Newsholme's "Vital Statistics," 3d edition, p. 266. From this column (m_x) the probability of living at each year of age (p_x) is obtained by the formula $p_x = \frac{2 - m_x}{2 + m_x}$ applied to each year of the series.

Column l_x is obtained by the formula $l_x \times p_x = l_x + 1$, and column P_x is obtained by the formula $\frac{l_x + l_{x+1}}{2}$.

From these tables it appears that, out of 100,000 children born alive in Massachusetts during the years 1893–97, 16,000 or nearly one-sixth die before arriving at the age of one year; 78,963 or nearly four-fifths attain the age of three years; 77,051 survive the age of five years, or seventy-seven per cent.; 50,124 or a little more than one-half attain the age of fifty-three years; 24,993 or nearly one-fourth live to the age of seventy-two years.

These figures present very decided differences as compared with those which were published for the same State in 1855 by Mr. E. B. Elliott.* In that report it was shown that the numbers dying before the close of the first year out of 100,000 born were 15,510, or nearly the same as those for the year 1895 for the same age. At the end of three years the survivors were only 74 per cent. instead of 79 per cent. as in 1895, and one-half had died before the close of the forty-first year, instead of surviving to the fifty-third as in 1895.

Since the numbers of each sex are unequal at birth, the males continue in greater numbers until the fifty-third year, when the greater death rate of the males has reduced their number below that of the females, and the females continue in excess throughout the remainder of life. Observing the tables more closely, it appears that the comparative intensity of the death rate of the sexes varies at different points of the table. For the first five years the death rate of males exceeds that of females. From age five to age nineteen inclusive the rate of females exceeds that of males, and from age twenty to the end of life the death rate of females is less than that of males.

In table 3 are presented two columns, in which are shown the probability of living one year from each age and the mortality per unit of the population at each year. At birth the probability of living a year is for males 0.82569 and for females 0.84939, that of boys at birth being about the same as for men of eighty-six, and that of girls about the same as that of women at eighty-six or eighty-seven. The probability of living a year is at its highest point for boys at age twelve (0.99722) and for girls it is about the same for age eleven as for age twelve (0.99695 and 0.99693).

A comparison of death rates at different periods presents certain points worthy of notice.

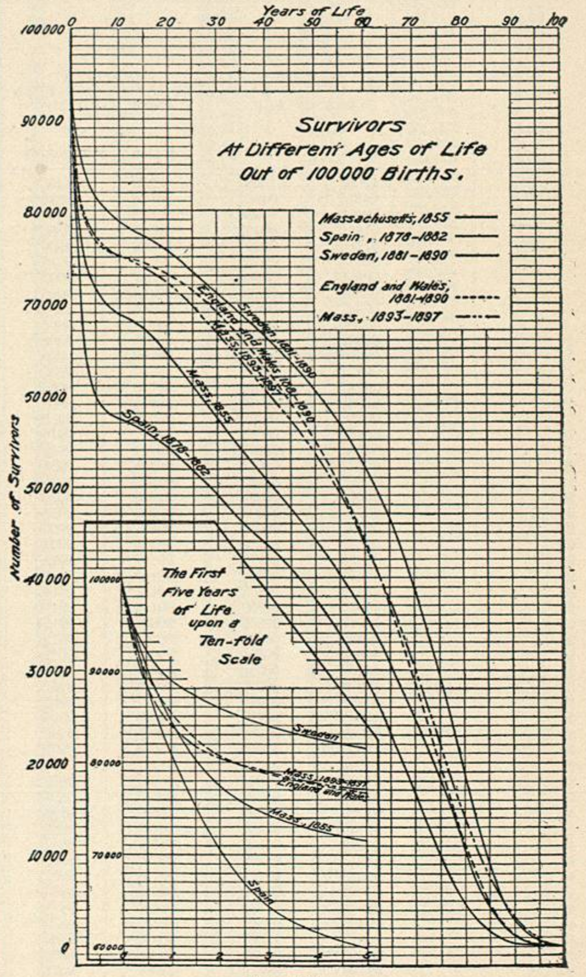

FIG. 5028.

* Sixteenth Registration Report, Massachusetts, 1857.

DEATH RATES AT DIFFERENT AGES OF LIFE, MASSACHUSETTS, AT TWO PERIODS, 1865 AND 1895.

Ages.	1865.	1895.	Ages.	1865.	1895.
All ages	20.64	19.0	30–40	11.7	9.7
			40–50	11.9	12.6
Under 5	68.6	64.5	50–60	17.5	20.4
5–10	9.6	6.2	60–70	32.9	39.4
10–15	5.1	3.2	70–80	70.5	82.4
15–20	9.6	5.3	All over 80	168.2	184.6
20–30	12.6	7.1			

The death rate of children under five, and especially of those under one year of age, has not undergone very marked changes, but that of all ages from five to forty has very perceptibly diminished, while that of ages above forty has increased. This result has been produced by the great reduction in the number of deaths from infectious diseases, including consumption, which occur in the early period of life, from two years up to thirty. By this means a much larger ratio of the population than formerly survives to live throughout the useful and wage-earning period of life. This causes a material increase in the number of years lived at the later ages of life.

These persons being spared from the diseases incident to childhood naturally increases the relative mortality from the diseases of adult life and old age.

This decided increase in the number of survivors throughout the useful ages of life has a marked effect upon the vitality of the population. It is undoubtedly due in no small degree to the increased attention which has everywhere been given in the past twenty-five years to public hygiene.

The accompanying diagram represents the numbers of survivors at the different ages of life in Sweden, England, Spain, and Massachusetts out of 10,000 at birth. Those of Massachusetts are presented for two periods 1893–97 and 1855, showing the marked changes which have taken place. Sweden is selected because it has a low death rate and is often selected as a standard of a healthy population. Spain, on the contrary, has a high death rate, which is chiefly due to excessive mortality in the early years of life. (See table on p. 264 and diagram on p. 262.)

In consequence of the close contiguity of the lines in

PRINCIPAL VITAL STATISTICS OF THE SIX NEW ENGLAND STATES (FOR THE NINE YEARS 1892–1900).

Mean annual population of the period (estimated).	MAINE, 680,961.		NEW HAMPSHIRE, 397,294.		VERMONT, 339,121.		MASSACHUSETTS, 2,564,484.		RHODE ISLAND, 393,784.		CONNECTICUT, 840,789.		TOTAL NEW ENGLAND, 5,216,433.	
	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.	Number.	Rate.
Marriages and rate per 1,000 population	49,706	8.11	35,385	9.90	25,481	8.45	205,738	8.91	30,925	8.72	59,084	7.81	406,319	8.66
Living births and rate per 1,000 population	127,954	20.88	73,554	20.58	62,904	20.61	630,798	27.33	92,200	26.02	177,700	23.48	1,165,110	24.82
Deaths and rate per 1,000 population	100,334	16.37	64,419	18.02	50,716	16.62	434,604	18.83	67,331	19.00	132,175	17.46	849,579	18.09
Deaths under one year and rate per 1,000 births	15,364	120.10	10,766	146.40	8,753	139.10	98,662	156.40	15,415	167.20	26,880	151.30	175,840	150.90
Deaths from consumption, and rate per 10,000 population	10,471	17.09	6,095	17.05	4,619	15.13	48,890	21.18	7,366	20.78	12,421	16.41	89,862	19.14
Deaths from pneumonia, and rate per 10,000 population	9,029	14.73	6,273	17.54	5,091	16.68	43,252	18.74	6,279	17.72	11,664	15.41	81,588	17.38
Deaths from typhoid fever, and rate per 10,000 population	2,015	3.29	994	2.78	952	3.12	6,242	2.70	1,025	2.89	2,126	2.81	1,354	2.84
Deaths from smallpox, and rate per 10,000 population	5	.008	0	0	1	.003	65	.03	7	.02	26	.03	104	.02
Deaths from measles, and rate per 10,000 population	331	.54	156	.44	172	.56	1,527	.66	532	1.50	800	1.06	3,518	.75
Deaths from scarlet fever, and rate per 10,000 population	367	.60	327	.91	278	.91	3,969	1.72	684	1.93	933	1.23	6,558	1.40
Deaths from diphtheria and croup, and rate per 10,000 population	1,582	2.58	1,035	2.89	970	3.18	12,765	5.53	1,793	5.06	3,514	4.64	21,659	4.61
Deaths from cholera infantum, and rate per 10,000 population	5,006	8.17	3,597	10.06	1,626	5.33	22,520	9.76	4,460	12.57	7,613	10.06	44,822	9.55
Deaths from cancer, and rate per 10,000 population	4,470	7.29	2,430	6.80	2,001	6.56	15,532	6.73	2,188	6.17	4,328	5.72	30,949	6.59

INTERNATIONAL VITAL STATISTICS.

Births per 1,000 of the Population in Certain Countries.

	England and Wales.	Scotland.	Ireland.	Denmark.	Norway.	Sweden.	Austria.	Hungary.	Switzerland.	German Empire.	Holland.	Belgium.	France.	Spain.	Italy.
Average of twenty-five years, 1875–1899	32.3	32.2	23.8	31.3	30.7	28.7	38.0	42.9	28.9	37.2	34.7	30.1	23.7	35.6*	36.6
1900	28.7	29.6	22.7	29.8	30.1	26.9	....	39.3	28.6	35.6	31.5	28.9	21.4	34.4	32.9

Deaths per 1,000 of the Population in Certain Countries.

	England and Wales.	Scotland.	Ireland.	Denmark.	Norway.	Sweden.	Austria.	Hungary.	Switzerland.	German Empire.	Holland.	Belgium.	France.	Spain.	Italy.
Average of twenty-five years, 1875–1899	19.3	19.4	18.1	18.5	16.7	17.1	28.8	32.7	20.8	24.4	20.6	20.3	22.0	30.4*	26.7
1900	18.2	18.5	19.6	16.9	15.8	16.8	....	26.9	19.3	22.1	17.8	19.3	21.9	29.4	23.7

Marriage Rates (1900). (Persons Married per 1,000 of the Population.)

	England and Wales.	Scotland.	Ireland.	Denmark.	Norway.	Sweden.	Austria.	Hungary.	Switzerland.	German Empire.	Holland.	Belgium.	France.	Spain.	Italy.
1900	16.0	14.6	9.6	15.3	13.9	12.3	....	17.7	15 5	17.0	15.2	17.2	15.5	17.7	14.3

* Spain, average of twelve years (1888–99).

the first five years of life, the figures for the first five years are given upon a separate diagram, in which the divisions representing the age periods are increased ten-fold.

The preceding tables present the Vital Statistics of the six New England States, for the nine years 1892–1900. The populations which are given for each State, and for the whole district, are the mean annual populations of the nine-year period.

The Tables of International Vital Statistics contain the birth and death rates for the twenty-five years, 1875–'99, and for the year 1900, and the marriage-rates (persons married per 1,000 living) for the year 1900 in the principal countries of Europe.

DATA FOR CONSTRUCTION OF DIAGRAM OF SURVIVORS. TABLE SHOWING SURVIVORS AT DIFFERENT AGES OF LIFE OUT OF 10,000 BORN.

	Sweden—‡ 1881-90.	England and Wales—* 1881-90.	Massachusetts— 1893-97.	Massachusetts—† 1855.	Spain—‡ 1878-82.
0	10,000	10,000	10,000	10,000	10,000
1	8,895	8,536	8,400	8,449	8,083
2	8,586	8,067	8,054	7,733	7,060
3	8,399	7,878	7,896	7,424	6,433
4	8,258	7,758	7,786	7,258	6,151
10	7,882	7,495	7,516	6,873	5,747
15	7,713	7,423	7,394	6,726	5,602
20	7,551	7,281	7,213	6,437	5,413
25	7,338	7,090	6,959	6,100	5,164
30	7,109	6,844	6,674	5,748	4,908
35	6,876	6,550	6,372	5,408	4,596
40	6,628	6,216	6,054	5,078	4,378
45	6,349	5,839	5,721	4,748	4,088
50	6,043	5,405	5,355	4,409	3,765
55	5,687	4,891	4,918	4,022	3,381
60	5,239	4,275	4,390	3,597	2,914
65	4,658	3,534	3,759	3,065	2,327
70	3,900	2,684	3,029	2,475	1,666
75	2,948	1,786	2,207	1,833	997
80	1,872	970	1,411	1,059	465
85	894	388	759	437	149
90	275	100	320	118	40
95	....	14	92	20.5	....
100	....	.9	14	2.2	....

* Fifty-fifth Report of Registrar-General, Supplement, vol. i., p. xiv.; vol. x., part i., p. 75.
† Sixteenth Registration Report, Massachusetts, 1857.
‡ Bulletin de l'institut international de statistique.

Samuel W. Abbott.

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VITILIGO.—This affection of the skin, which is likewise known by the name of leucoderma, consists in the development of whitened areas upon various portions of the body, but especially upon the face, neck, and hands. It is due to localized loss of pigment in rounded or ovoid patches of various size, having sharply defined margins and surrounded by more or less deeply pigmented skin which gradually shades off into the normal. The characteristic features of the whitened spots are, that their border is usually convex, giving the impression that they extend into their darkened surroundings, or that, in their advance, they drive the pigment before them; that there is no change in the structure, sensations, or secretions of the affected areas; and that their tendency is to persist and to increase in extent, being little affected by any treatment. It is an acquired condition which comes on usually in youth or early adult life without previous ill health or prodromes, although in some instances it has been known to follow local injury; and sometimes it develops in the neighborhood of a pigmented mole. The dark-skinned races are rather more subject to vitiligo than those of fair skin and light hair, and it is not so very rarely seen in the negroes of this country, in whom the contrast be-

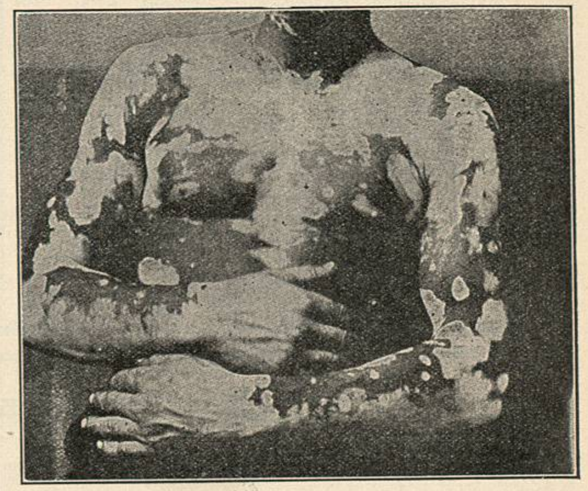

FIG. 5029.—Vitiligo.

tween the perfectly white spots and the normal skin produces a striking effect. I have seen instances in which much discomfort of mind was occasioned by the fact that the white patches were merging into each other until extensive regions of the body had lost their pigment, and the negro was fearful that he was "turning into a white man." The hair may lose its pigment in the same way as the skin, and rounded or irregular tufts of gray may appear upon the head. In white races the affected regions are often more noticeable in the summer time, when the surrounding pigmentation becomes deeper

The *diagnosis* of vitiligo is not difficult, although it is liable to be confounded with morphœa, chloasma, tinea versicolor, syphilitic pigmentations, macular leprosy, and albinism. One chief point by which it is distinguished from other conditions is the normal condition of the skin, apart from its loss of pigment. In morphœa there are structural changes. In tinea versicolor the patches are inflammatory and itchy, and from them there can be scraped scales which show, under the microscope, the characteristic groups of spores, although, when circumscribed areas of healthy white skin are enclosed in the brownish patches of this disease, vitiligo may be closely simulated; but the margins will be found irregular instead of clean-cut. In chloasma there is increased pigmentation of the patch itself and the circumference is the part which appears white. The distinction has been made that in vitiligo the margin of the white area is convex toward that which is pigmented, while in chloasma it is concave; but in some instances the patches run together in such a way that this distinction becomes more theoretical than apparent. Syphilitic pigmentations, especially about the neck in women, may persist after other manifestations have disappeared and may, in some instances, be mistaken for vitiligo. In the macular form of lepra the patches of white skin have an irregular outline, not so abrupt as in vitiligo, and the tinge is rather grayish than dead white; then, too, the skin is either thickened or atrophied and anæsthesia or impaired sensation is present. Finally, in albinism we have, as in vitiligo, an absence of normal pigment, but in the former it is a congenital defect and the whole surface of the body, including the hair and eyes, may be devoid of pigment.

The *pathology* of vitiligo is obscure. Leloir has described a parenchymatous neuritis in which the axis cylinder had disappeared, the myelin sheath had broken down, and the nerve fibre had become transformed into an empty primitive sheath, whose nuclei had proliferated. The affection begins as a hyperpigmentation in areas which run into one another and assume a polycyclic character, the pigment becoming absorbed from the centre and deposited in excess in the marginal epidermis, the connective-tissue cells, and about the vessels and hair follicles.

The *etiology* of vitiligo is not well understood, but the cause of the condition is usually ascribed to perverted innervation. It is probable that the disappearance of the pigment from one spot and its increased deposit in a neighboring part is due to atrophy in the former and to hypertrophy in the latter, both changes being effected through the agency of the sympathetic nervous system. Sometimes, though rarely, the proper proportion of pigmentation is spontaneously restored, but in the majority of instances the affected areas tend to increase in extent and the condition to assume marked chronicity. When large areas of surface are involved the term leucoderma becomes appropriate.

The *treatment* is unsatisfactory. Some reports of success from electricity have been made. Local applications for the removal of surrounding pigmentation are resorted to with the view of rendering the white regions less noticeable. The internal administration of nerve tonics, especially strychnine and arsenic, has been advised. Blistering the patches to excite a deposit of pigment has been tried, but the results are not brilliant. If the spots are located upon the face or other exposed part, artificial staining may be employed, and dyes used to restore the color of the hair. *Charles Warrenne Allen.*

VITREOUS BODY OR HUMOR.—ANATOMY.—The vitreous body is a transparent, semifluid, colorless mass, of soft gelatinous consistence, subglobular in form, which fills the posterior four-fifths of the interior of the eyeball; it is bounded by the optic-nerve entrance and retina behind, by the retina on each side, and in front by the lens and its suspensory ligament which fit into a depression known as the patellar fossa. It serves as a support to the tunics of the eyeball, and, of lesser importance, as a clear refractive medium; its index of refraction is slightly greater than that of distilled water. Chemically, it consists of 98.5 per cent. water and 1.5 per cent. solids.

There has been much discussion regarding the structure of the vitreous. When the fresh substance is thrown upon a muslin filter, the greater part passes through as a watery liquid, a very small proportion remaining behind—demonstrating the existence of a *supporting framework* and a fluid portion. It is quite generally held that there is a very delicate fibrillar *reticulum*, in which are scattered a few round or branched cells of the connective-tissue type, most abundant in the periphery, and often a variable number of migratory leucocytes. The cells are known as *vitreous corpuscles;* they are often difficult to recognize; they are peculiar in exhibiting large vacuoles which push the nucleus to one side, and in presenting a number of budlike swellings (Fig. 5030).

The vitreous body is enclosed in a delicate, structureless, glassy membrane, the *hyaloid membrane*, which lies in close apposition with the entire inner surface of the retina; it can be readily separated from the latter, except posteriorly where the retinal vessels of fœtal life have entered, and anteriorly at the patellar fossa. At the ora serrata, the hyaloid membrane splits into two layers: the first, the hyaloid membrane proper, exceedingly delicate, which is continued over the anterior surface of the vitreous body; and the second, which blends with the posterior layer of the suspensory ligament of the lens.

The central portion of the vitreous body is penetrated by a channel (*hyaloid canal, canal of Stilling, canal of Cloquet, central canal*); this is filled with fluid, is limited by a wall of extremely delicate homogeneous membrane, and extends from the disc to the posterior pole of the lens; it is about 2 mm. in diameter, with a slight dilatation at both ends. This canal conveys the hyaloid branch of the central artery to the lens during fœtal life; in the adult it forms part of the posterior lymph passages of the eyeball, having its outlet in the lymph spaces of the optic nerve.

The adult vitreous has no blood-vessels, its nourishment being received from the surrounding structures, particularly the uvea; hence diseases of the retina, choroid, and ciliary body almost always implicate the vitreous. Vitreous humor is never regenerated after loss; the diminution in volume is compensated for by the addition of aqueous. If the escape of vitreous is small, no injurious effects follow; if large, the consequences are serious—the globe softens, shrinkage results, and sight is lost.

DISEASES OF THE VITREOUS BODY.

CONGENITAL ANOMALIES.—1. *Persistent Hyaloid Artery.*—During fœtal life the hyaloid artery, a branch of the central artery of the retina, passes through the central canal of the vitreous from the optic-nerve entrance to the posterior pole of the lens; it usually begins to shrivel during the sixth month and has generally disappeared at the end of fœtal life. Sometimes this process of obliteration fails, and a greater or lesser remnant of the artery persists during life. This can be seen with the ophthalmoscope as a grayish cord or thread which arises from the optic disc and stretches into the vitreous for a variable distance; it may terminate by a free extremity in the vitreous, or may traverse the latter and be attached to the posterior pole of the lens, the attachment to the lens being marked by a small opacity (congenital posterior polar cataract); or the thread may be attached to the lens with its free end floating in the vitreous; or the vestige may be represented by an irregular, minute deposit of connective tissue upon the disc. In rare instances the persistent artery continues to carry blood. Vision is generally good, but sometimes such eyes are amblyopic or present other congenital defects.

2. *Opacity of the Walls of the Hyaloid Canal.*—In unusual instances the walls of the hyaloid canal are abnormally opaque, causing some interference with central acuteness of vision; this anomaly is visible with the ophthalmoscope as a grayish, tubular cord extending from disc to lens.

HYALITIS (*Inflammation of the Vitreous*).—This term includes two types: first, a purulent inflammation (*suppurative hyalitis*), and second, a form characterized by the occurrence of *opacities in the vitreous*. As will be

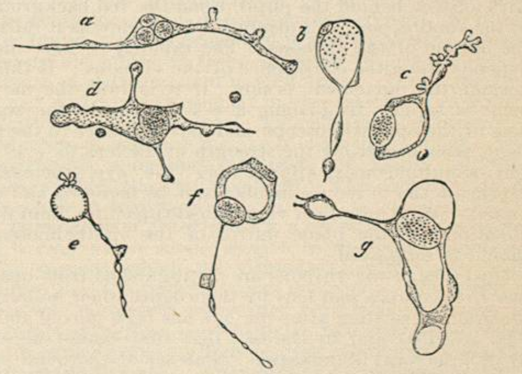

FIG. 5030.—Cells of the Vitreous Humor. (Schwalbe.) *a* and *d* without vacuoles; *b, c, e, f, g,* vacuolated.

readily understood by considering the avascular and almost structureless nature of this tissue, inflammations of the vitreous are rarely primary; they generally accompany or are the result of inflammation of the retina and uveal tract.