pressor drugs—for example, desoxyephedrine—but such care is, surely, the first requirement of any patient in an acute hypotensive state.

Summary

Noradrenaline, the transmitter substance of the sympathetic nerves, has a predominantly local action and its steady release at the nerve endings causes constriction of the local blood vessels. The overall activity of the sympathetic nerves results in the normal peripheral vasomotor resistance, which is a major factor in the maintenance of the blood pressure.

Adrenaline is an "emergency substance" liberated into the circulation and acting generally. Under physiological conditions it causes an overall vasodilatation and an increase in cardiac output.

Only in phaeochromocytoma of the suprarenal gland has a direct relationship with disease been established with the neurohormones, adrenaline and noradrenaline.

Noradrenaline would appear to be the most rational agent in the treatment of the hypotensive state due to peripheral collapse.

REFERENCES

- Allen, W. J. (1948). *Clin. Sci.*, **6**, 269.
 — Barcroft, H., and Edholm, O. G. (1946). *J. Physiol.*, **105**, 255.
 Bacq, Z. M. (1934). *Ann. Physiol. Physicochim. biol.*, **10**, 467.
 Barclay, J. A., Cooke, W. T., and Kenney, R. A. (1947). *Amer. J. Physiol.*, **151**, 621.
 Barcroft, H., and Konzett, H. (1949). *Lancet*, **1**, 147.
 — and Swan, H. J. C. (1951). *J. Physiol.*, **112**, 273.
 — and Starr, I. (1951). *Clin. Sci.*, **10**, 295.
 Barger, G., and Dale, H. H. (1910). *J. Physiol.*, **41**, 19.
 Barnett, A. J., Blacket, R. B., Depoorter, A. E., Sanderson, P. H., and Wilson, G. M. (1950). *Clin. Sci.*, **9**, 151.
 Bear, A. G., Billing, B., and Sherlock, S. (1952). *J. Physiol.*, **115**, 430.
 Burn, J. H., and Hutcheon, D. E. (1949). *Brit. J. Pharmacol.*, **4**, 373.
 Cahill, G. F., and Monteith, J. C. (1951). *New Engl. J. Med.*, **244**, 657.
 Calkins, E., Dana, G. W., Seed, J. C., and Howard, J. E. (1950). *J. clin. Endocrinol.*, **10**, 1.
 Cannon, W. B. (1940). *Bull. N.Y. Acad. Med.*, **16**, 3.
 Churchill-Davidson, H. C. (1951). *British Medical Journal*, **2**, 1551.
 Duff, R. S., and Swan, H. J. C. (1951). *J. Physiol.*, **114**, 41.
 Elliott, T. R. (1905). *Ibid.*, **32**, 401.
 Euler, U. S. von (1946). *Acta physiol. scand.*, **12**, 73.
 — (1950). *Ergebn. Physiol.*, **46**, 261.
 — (1951). *British Medical Journal*, **1**, 105.
 Fowler, N. O., Westcott, R. N., Scott, R. C., and McGuire, J. (1951). *J. clin. Invest.*, **30**, 517.
 Goldenberg, M. (1951). *Amer. J. Med.*, **10**, 627.
 Apgar, V., Deterling, R., and Pines, K. L. (1949). *J. Amer. med. Ass.*, **140**, 776.
 — Aranow, H., jun., Smith, A. A., and Faber, M. (1950). *Arch. Intern. Med.*, **86**, 823.
 — Faber, M., Alston, E. J., and Chargaft, E. C. (1949). *Science*, **109**, 534.
 — Pines, K. L., Baldwin, E. de F., Greene, D. G., and Roh, C. E. (1948). *Amer. J. Med.*, **5**, 792.
 Holton, Pamela (1949). *Nature*, **163**, 217.
 Iglaier, A., and Altschule, M. D. (1940). *J. clin. Invest.*, **19**, 503.
 Judson, W. E., Epstein, F. H., and Wilkins, R. W. (1950). *Ibid.*, **29**, 1414.
 King, B. D., Sokoloff, L., and Wechler, R. L. (1952). *Ibid.* In press.
 de Lary, C., Greenfield, A. D. M., McCorry, R. L., and Whelan, R. F. (1950). *Clin. Sci.*, **9**, 71.
 McMichael, J., and Sharpey-Schafer, E. P. (1944). *Brit. Heart J.*, **6**, 33.
 Marsh, D. F., Pelletier, M. H., and Ross, C. A. (1948). *J. Pharmacol.*, **92**, 108.
 Starr, I., Gamble, C. J., Margolies, A., Donal, J. S., jun., Joseph, N., and Eagle, E. (1937). *J. clin. Invest.*, **16**, 799.
 — and Swan, H. J. C. (1949). *Lancet*, **2**, 508.
 — (1951a). Unpublished data.
 — (1951b). *J. Physiol.*, **112**, 426.
 — (1951c). Thesis, University of London.
 — (1951d). *British Medical Journal*, **1**, 440.
 Vigran, I. M., and Essex, H. E. (1950). *Amer. J. Physiol.*, **162**, 230.

Addressing the Institute of Almoners at B.M.A. House on March 28, Miss M. P. Hornsby-Smith, Parliamentary Secretary to the Ministry of Health, said that it had become increasingly clear that the hospital almoner was now one of the most important contributors to rehabilitation. The work of the physician or surgeon and of the authorities responsible for ensuring that people who had been ill were restored to health and able to find and keep jobs would be seriously hampered were it not for the presence of the almoner. In the National Health Service they regarded rehabilitation as one of the most promising developments of the present time—not least because it enabled them to make a more effective use of the hospital beds and out-patient facilities available.

STATURES OF A GROUP OF UNIVERSITY STUDENTS AND OF THEIR PARENTS

BY

J. V. G. A. DURNIN, M.A., M.B., Ch.B.

AND

J. B. de V. WEIR, M.A., M.B., Ch.B., B.Sc.

(From the Institute of Physiology, University of Glasgow)

Although there is an abundance of statistical material relating to the statures of populations of widely differing ages, there have been remarkably few attempts to compare directly the heights of a group of parents and of their offspring. Two exceptions, however, are reported in the papers by Pearson and Lee (1903), and by Bowles (1932).

There is no doubt that present-day children are growing faster than those of previous generations. But is the final adult stature to-day greater than the adult stature in the past? Authoritative British opinion at the moment is against the view that adults to-day are taller than adults in the past. However, Pearson and Lee (1903) in this country, and Bowles (1932) in the United States of America, came to the conclusion that there was some increase in adult stature in the second generation.

At a Conference Meeting of the Nutrition Society in 1950 Dr. B. Woolf suggested that in view of these contradictory conclusions another survey of the heights of young adults and of their parents would be interesting (Weir, 1951).

Accordingly it was decided to compare the heights of the students attending the course in physiology at Glasgow University with those of their parents.

Methods

The students were measured in the Institute by one of us (J.D.), using a wooden calliper. Then in groups of two to four the students were given explicit detailed instructions and a demonstration of how to measure their parents. They took home with them special 7-foot (213-cm.) inextensible inch tapes and a printed card containing a list of the information required.

There were 330 students in the physiology classes. In 38 instances one or both parents were not alive, and another 45 students were living away from home and thus unable to see their parents for some months. The remaining 247 undergraduates, 63 women and 184 men, all domiciled in Glasgow or within a radius of about 30 miles (48 km.), were included in the investigation.

Results

The results showed that 76.2% of the women students were taller than their mothers and 73.9% of the men taller than their fathers. The differences of these percentages from the expected 50% on a null hypothesis—that is, that there has been no increase in stature—are very highly significant ($P < 0.001$). Even if we restrict ourselves to comparing the number of students who are an inch (2.5 cm.) or more taller than their parents with those who are less than an inch (2.5 cm.) taller, the result is still highly significant ($P < 0.01$).

The mean height of the women students was 64.4 in. (163.6 cm.)—S.D. 2.0 in. (5 cm.)—and of their mothers 62.7 in. (159.3 cm.)—S.D. 2.1 in. (5.3 cm.)—a difference of 1.7 in. (4.3 cm.). The 95% fiducial limits of this difference are 2.44 and 0.96 in. (6.2 and 2.4 cm.).

TABLE I.—Frequency Distribution of Statures of Women Students and Their Mothers, and of Men Students and Their Fathers

Height	Mothers	Daughters	Fathers	Sons
ft. in. cm.				
4 9 (144.8)	0	0	1	0
4 10 (147.3)	1	0	0	0
4 11 (149.9)	1	0	0	0
5 0 (152.4)	1	0	2	1
5 1 (154.9)	4	0	3	1
5 2 (157.5)	5	1	3	0
5 3 (160.0)	5	6	9	0
5 4 (162.6)	8	6	13	9
5 5 (165.1)	19	10	21	6
5 6 (167.6)	11	14	21	15
5 7 (170.2)	3	10	27	22
5 8 (172.7)	2	8	25	29
5 9 (175.2)	0	5	22	32
5 10 (177.8)	3	2	20	23
5 11 (180.3)	0	1	12	18
6 0 (182.9)	0	0	4	13
6 1 (185.4)	0	0	1	8
6 2 (188.0)	0	0	0	5
6 3 (190.5)	0	0	0	1
6 4 (193.0)	0	0	0	1
Total	63	63	184	184

The mean height of the men students was 69.1 in. (175.5 cm.)—S.D. 2.6 in. (6.6 cm.)—and of their fathers 67.3 in. (170.9 cm.)—S.D. 2.7 in. (6.9 cm.)—a difference of 1.8 in. (4.6 cm.). The 95% fiducial limits of this difference are 2.35 and 1.25 in. (6 and 3.2 cm.).

TABLE II.—Frequency Distribution of Excess of Stature of Men Students Over that of Their Fathers

Inches	Men Students	Inches	Men Students
+7	3	-1	21
+6	11	-2	6
+5	10	-3	4
+4	19	-4	3
+3	23	-5	0
+2	28	-6	1
+1	27		
0	28		
		Total	184

The mean height of the fathers of the women students was 68.0 in. (172.7 cm.), which is 0.7 in. (1.8 cm.) greater than that of the fathers of the men students. The mean height of the mothers of the men students was 62.5 in. (158.7 cm.), and this is 0.2 in. (0.5 cm.) less than that of the mothers of the women students. It will thus be seen that both parents of the women students are, on the average, taller than the parents of the men students. The differences, though not significant, suggest, if one accepts as valid that stature increases as the social scale rises, that there may be a socio-economic difference in the classes from which the women and men students are drawn. Indeed, other information lends support to this view.

In order to allow for the influence of the father of the female student and of the mother of the male student, a correction was made by using a regression coefficient, from which the probable value of stature in the offspring was determined when the value of both parents' stature was known. When this was done, the effect was to diminish the expected mean height of the women students by between 0.1 and 0.2 in. (0.25 and 0.5 cm.), and to increase the expected mean height of the men students by an even smaller fraction. Clearly, then, the effect of these corrections will not in any way influence any conclusions to be drawn from the results.

As a check on the measurement of the parents, a 10% sample was visited and their heights obtained, using the standard wooden calliper. The results showed that, on the average, the heights of the fathers had been overestimated by 0.4 in. (1 cm.) and the heights of the mothers overestimated by 0.25 in. (0.6 cm.). No correction was made for this difference.

In view of the possibility that the stature of an adult decreases with advancing years it is necessary to note the ages of the subjects. The mean age of the women undergraduates was 19½ years and that of the men 20 years. The mean age of the mothers was 51 years and that of the fathers 53 years.

TABLE III.—Age Distribution of Parents of Students

	Age in Years								Total
	35-40	41-45	46-50	51-55	56-60	61-65	66-70	71-75	
Men	2	17	56	75	63	25	6	3	247
Women	5	33	87	74	36	11	1	0	247

TABLE IV.—Age Distribution of Students

	Age in Years															Total
	18	19	20	21	22	23	24	25	26	27	28	29	30			
Men	22	74	22	19	19	10	8	6	3	0	0	0	1	184		
Women	14	26	9	6	6	1	1							63		

Discussion

It is interesting to compare the mean height of this Glasgow undergraduate population with that of some other populations. Oxford undergraduates (Parnell, 1950—personal communication) have a mean height of 69.9 in. (177.5 cm.) for men. Schuster (1911) found in 959 Oxford men undergraduates a mean height of 69.49 in. (176.5 cm.). There seems to have been little change in the height of Oxford students in the past 40 years.

A survey of 1,077 Cambridge undergraduates (Pearson, 1902) showed a mean height of 68.9 in. (175 cm.), and this is also the figure given by Cathcart, Hughes, and Chalmers (1935) as the mean for 1,735 male students in Scottish and English universities.

Figures for the general young adult male population in Scotland, taken from measurements in 1939 of 9,600 men between 20 and 21 years of age (Martin, 1949) give a mean height of 67.0 in. (170 cm.). So that, though the male students examined in this survey are shorter than contemporary Oxford students, they are considerably taller than men of a comparable age in the general population.

There are two possible explanations for the very appreciable differences in height between parent and adult offspring in the present investigation. First, there may have been a real secular increase in height, so that the students are taller now than their parents were at a comparable age; secondly, the parents, when they were young adults, may have been just as tall as their offspring are to-day, but since then there has been a considerable shrinkage in the parents' stature. The possibility that both factors play a part is not excluded.

A scatter diagram showed that the age difference between the individual student and the parent did not appear to have any influence on the height difference.

A shrinkage in stature in old age is generally accepted as a fact. But is this a continuous uniform process throughout the years of adult life or does it set in at a certain period? Is it a normal process of senescence? Is it influenced by employment?

Undoubtedly, if a survey were made of all adults living to-day in this country it would be found that the mean height was at a maximum in the early adult age groups. Cathcart *et al.* (1935) found a decrease of approximately 1.1 in. (2.8 cm.) in height between the ages of 23 and 53 in men in industrial employment in this country. Kemsley (1950) more recently observed a similar decrease over the same age range in men employed in large industrial firms. He also measured women and found a decrease of about 1 in. (2.5 cm.).

These observations, however, were not made on the same individuals with a lapse of 30 years between the measurements. Such measurements, so far as we know, have never been made. The two age groups, as in our case, belonged to successive generations. In our series we had the advantage that, by measuring actual parent and offspring, we probably reduced random variations to a minimum. Until measurements are made on the same individuals after a

lapse of 25 to 30 years to demonstrate the extent or even existence of a decrease in individual stature with increasing age it is begging the question always to refer to a fall or decrease in stature. We have no positive evidence that such a fall exists, and we prejudice the issue by closing our eyes to the possibility of a real increase in stature.

Nevertheless, in Britain most present-day authorities hold the view expressed by Morant (1950), that the difference in stature between young adults and those of an earlier generation is due wholly to anatomical changes in joints and cartilages. Yet two separate surveys, one by the Anthropometric Committee of the British Association (Galton, 1883) and the other a Medico-Actuarial Mortality Investigation in America (1912) from 1885 to 1900, show a constant maintenance of height in men up to an age of well over 60 years. Kemsley is of the opinion that in both these surveys the absence of a decrease in height with advancing years may be attributed to the higher socio-economic status of these earlier samples as compared with the industrial population of the more recent series. By and large one would expect the parents of university students to be less exposed to the strain of industrial employment than other sections of the population. However this may be, the offspring-parent difference in stature we have observed in men is significantly greater than the difference attributed by Cathcart *et al.* to shrinkage on the part of the parent. In the case of women students and their mothers, owing to the smaller numbers measured the significance barely reaches the conventional 5% level.

Pearson and Lee (1903), investigating a population comparable to the present one, and measuring span and forearm as well as stature, published results similar to ours, though they are not quite so striking. Their findings showed a distinct increase in all these measurements in the second generation when compared with the first. They concluded that "there seems no reason to suppose that the population, as far as the middle classes are concerned, is degenerating. In span, stature, and forearm, the younger generation is sensibly better than its parents."

Bowles (1932), in a comparison of the heights of 1,166 fathers who had been Harvard students with their 1,461 sons also at Harvard, was quite emphatic that there had been a secular increase in height. The fathers, measured between 1875 and 1910, had a mean height of 68.6 in. (174.2 cm.), whereas the mean height of the sons was 70.0 in. (177.8 cm.).

The secular increase in the rate of growth of school-children is beyond any doubt. A comparable though smaller increase in adult stature may reasonably be expected, and is supported by the data presented. While improved nutrition is probably an important factor in these changes it is evident that other factors also play a part. What these are and how long the upward trend will continue are meantime matters for speculation.

Summary

The heights of 63 women and 184 men students at Glasgow University were compared with those of their parents. The mean height of the women students was 1.7 in. (4.3 cm.) more than that of their mothers, and the mean height of the men students was 1.8 in. (4.6 cm.) more than that of their fathers.

It is difficult to believe, in accord with most present-day British authorities, that these differences are wholly due to shrinkage on the part of the parents, and the view is put forward that a real secular increase in height is at least a factor.

We should like to express our indebtedness to our students and to their parents for their tolerance and ready co-operation. Our thanks are also due to Professor R. C. Garry for his many valuable suggestions and criticisms.

REFERENCES

- Bowles, G. T. (1932). *New Types of Old Americans of Harvard*. Harvard Univ. Press, Cambridge.
Cathcart, E. P., Hughes, D. E. R., and Chalmers, J. G. (1935). *Industr. Hlth Res. Bd. Rep. No. 71*.
Galton, F. (1883). *British Association for the Advancement of Science. (Report of the Anthropometric Committee.)*
Kemsley, W. F. F. (1950). *Ann. Eugen., Camb.*, 15, 161.
Martin, W. J. (1949). *M.R.C. Memo. No. 20*. London.
Medico-Actuarial Mortality Investigation (1912). 1. New York.
Morant, G. M. (1950). *Proc. roy. Soc. B*, 137, 443.
Pearson, K. (1902). *Biometrika*, 1, 38.
— and Lee, Alice (1903). *Ibid.*, 2, 357.
Schuster, E. (1911). *Ibid.*, 8, 40.
Weir, J. B. de V. (1951). *Brit. J. Nutrit.*, 5, 166.

Medical Memoranda

Uncommon Neurotoxic Symptom Associated with Dihydrostreptomycin Therapy

One of the commonest neurotoxic signs of streptomycin therapy is that of vestibular dysfunction. It usually appears about the third week after treatment has begun, though it may appear later, even after treatment has terminated, and it may be associated with blurring of vision (M.R.C., 1948; Tucker, 1949; Packard *et al.*, 1949; Bignall *et al.*, 1951). Varying degrees of interference with function of the auditory nerve have been recorded by a variety of observers (Hinshaw and Feldman, 1945; Howlett *et al.*, 1949; Riggins *et al.*, 1949; Brown *et al.*, 1949; Tucker, 1949). In a few cases transient diplopia and temporary paralysis of an external ocular muscle have been noted (Packard *et al.*, 1949; Riggins *et al.*, 1949).

CASE REPORT

A woman aged 22 with pulmonary tuberculosis was given dihydrostreptomycin, 1 g. a day, with sodium *para*-aminosalicylate, 20 g. a day, on July 27, 1951. On August 15 she developed very severe vertigo, accompanied by frontal headache, and a coarse rotatory nystagmus with its slow component towards the right. The eye movements were most marked on looking towards the left. At this stage the combined therapy was stopped. On August 17 she developed marked diplopia, especially troublesome on looking to the right and downwards. The diplopia was uncrossed and the false image lay external to and tilted towards the true image. There was also a slight degree of impairment of hearing, more marked on the right than on the left. Cerebrospinal fluid was normal. By August 22 the diplopia had disappeared and the vertigo was much improved. The nystagmus was still quite marked, but by September 13 the patient was able to walk, experiencing only slight dizziness if she had to turn sharply; a fine rotatory nystagmus on looking to the right or left was also still apparent, though there was no evidence of any dysfunction of the auditory nerves.

COMMENT

Rashes during streptomycin therapy, believed to be examples of sensitization phenomena, occur most often in the third week, but sometimes as late as the seventh week (Howlett *et al.*, 1949; Riggins *et al.*, 1949). Vestibular dysfunction, though it can occur as late as the fifth week, is commonest in the third week (M.R.C., 1948; Packard *et al.*, 1949; Riggins *et al.*, 1949; Doman *et al.*, 1949; Bignall *et al.*, 1951). The same time-frequency relationship in cases associated with blurring of vision was noted by Bignall *et al.* (1951). In the above case the signs of vestibular dysfunction and those of external ophthalmoplegia both appeared on the 18th and the 20th day of treatment. This suggests that there is some common aetiological factor at work in all these instances. Whether this factor is of an allergic nature is so far unproved, though Bignall and his co-workers (1951)