

REPORT ON THE QUESTIONNAIRE ON THE ORGANIZATION OF PHARMACOLOGY IN GREAT BRITAIN

BY

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In 1964 the British Pharmacological Society, concerned about the recruitment and training of pharmacologists, about the growth in size of its meetings, and about the organization of the teaching of pharmacology, set up a small committee* to consider these problems. The Committee recommended that a questionnaire be sent out to obtain the facts about the organization and training now provided for pharmacology in this country. The questionnaire was sent out to 88 departments. All the forms were returned, and this report is based on the answers received. Details of the present situation in departments refer to that situation on May 1, 1964.

An initial problem was that of to whom to send the questionnaire. It was finally sent (a) to the heads of all departments of pharmacology in universities and technical colleges ; (b) to the heads of all industrial departments with a member of the Society on their staff ; (c) to a number of other research units, again identified through possessing a member of the Society on their staff. The enquiry has thus focused on the pharmacological activity in this country as reflected in the Society's membership. This leaves certain gaps: (1) teaching and research, and recruitment in clinical pharmacology in medical, surgical, anaesthetic and other clinical departments ; (2) research by and recruitment of pharmacologists in the broader industrial fields with pharmacological interests (e.g., food and agriculture): (3) recruitment of pharmacologists for the more administrative aspects of biological and medical work. The survey is believed, therefore, to describe fully the country's resources for producing and training pharmacologists ; but it does not cover the whole field of those concerned with activities requiring pharmacological training, nor can it give a complete picture of the demand for trained men (required for instance in the control of food additives and pesticides). No readily feasible method was available to the Society for this broader enquiry.

NUMBERS

The pharmacologists in Great Britain fall into three groups (Table 1). First are those in established positions in academic departments, 216 in number. Of these 155 are associated with medical schools and carry the responsibility for teaching pharmacology

* The Committee, in its various forms, included Professor J. M. Robson, Professor F. R. Winton, Professor H. O. Schild, Dr J. D. P. Graham, Dr L. Goodwin, Dr H. O. J. Collier, Dr A. Spinks, and Professor W. D. M. Paton. Dr C. R. B. Joyce advised on the drafting of the questionnaire, and Dr Y. S. Bakhle was appointed to assist in its conduct and analysis. The help of Mrs Nesta Dean is gratefully acknowledged. A generous grant was made by the Smith, Kline and French Institute to cover the expenses.

(and in some schools therapeutics) to British medical students. With an intake of 3,016 students a year, there is a staff/student ratio of about 1:20 (Table 3). A corresponding responsibility for preparing students for a pharmacy qualification, or for more advanced qualification usually leading to an industrial post, falls to the staff, 61 in number, of the pharmacy schools and technical colleges. Here the staff/student ratio is 1:14. The average number of staff in medical or pharmacy departments is about 5, although it varies considerably.

A second substantial group, 252 in number, is that termed "research staff" (Table 2). This includes graduate students, young postdoctoral workers gaining further experience, visiting workers of varying seniority, and a relatively small number of established posts specifically designated as research (rather than teaching) appointments. Although, averaged over all departments, they bring a further 6 members of staff per department, their distribution is uneven and 7 departments have no staff of this kind at all. Far the largest number of them are supported by outside funds, and it is chiefly the medical schools that attract these funds; presumably it is only departments above a certain size that can provide facilities for them. This group provides an invaluable supplement to the teaching resources of their departments, particularly in the conduct of practical classes. Nearly two-thirds of them help with teaching; in medical schools they constitute 45% of the teaching staff and if they are assumed to do as much teaching as established teaching staff, they bring the staff/student ratio down in medical schools to 1:8, and in pharmacy schools to 1:10.

The third major group is that of the pharmacologists in industry, a group of 223. Industrial departments are about twice the size of university departments, but are equally varied in size. In addition, "other units" contribute a further 34.*

There are thus 725 engaged in pharmacological work, teaching or research or both, of whom 473 are in established posts (Table 3). These numbers may be compared with the present size of the British Pharmacological Society: 343 ordinary members (of whom 43 are resident overseas), 8 honorary members, and 52 associate members (1965 Handbook).

SPACE (Table 4)

In the questionnaire no distinction was made between research and teaching space, and where shared teaching space has been mentioned it has been counted as departmental space. An addition of 25% has been made when appropriate for circulation area, to give the gross area provided.

The main fact about the provision of space is the extremely wide variation, from one department with less than 500 sq. ft. to two departments of over 20,000 sq. ft. Half the departments are of 5,000 sq. ft. or less.

Table 4 also attempts to indicate the space provided in relation to the staff and students requiring it. Medical schools are a little better provided for than pharmacy schools. In assessing the generosity of provision of space for staff (650 sq. ft. on the average) in order to arrive at, for instance, the research space available per man, suitable deduc-

* The "other units" vividly illustrated the interdisciplinary nature of pharmacology. They presented uncertainties of classification and have therefore sometimes been omitted from the analysis.

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TABLE 1
NUMBERS OF ESTABLISHED STAFF IN UNIVERSITIES, INDUSTRY AND OTHER UNITS

	No. of departments	Total staff	Average	Median	Range
Universities:					
Medical schools	29	155	5.3	5	1-11
Pharmacy schools	13	61	4.7	4	1-9
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	42	216	5.1	4	1-11
Industry	28	223	8.0	7	1-23
Other units	10	34	3.4		
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Total	80	473	5.9		
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TABLE 2
(a) NUMBERS OF RESEARCH STAFF IN UNIVERSITY DEPARTMENTS (INCLUDING GRADUATE STUDENTS AND VISITORS, EXCLUDING ESTABLISHED STAFF)

	No. of departments supported	Total staff	Average over all departments
University funds	22	65	1.5
Outside funds	27	160	3.8
Visitors	13	27	0.6
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Total		252	6.0
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(b) DISTRIBUTION OF RESEARCH STAFF BETWEEN MEDICAL AND PHARMACY SCHOOLS

	Medical			Pharmacy		
	No. of staff	No. of departments supported	Average per dept. supported	No. of staff	No. of departments supported	Average
University funds	33	13	2.5	32	9	3.6
Outside funds	150	24	6.3	10	3	3.3
Visitors	21	11	1.9	6	2	3.0
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Total	204			48		
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Numbers of research staff who help with teaching:

Medical schools 124 = 61%
Pharmacy schools 29 = 60%

Total 153 = 61%

TABLE 3
TOTAL NUMBERS OF PHARMACOLOGISTS

	Total staff	Undergraduates	Staff : student ratio
<i>Established staff:</i>			
Universities: Medical schools	155	3,016	1 : 19.5
Pharmacy schools	61	872	1 : 14.3
Industry	223	—	—
Other units	34	—	—
<i>Research staff:</i>			
Universities: Medical schools	204		
Pharmacy schools	48		
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Total	725		
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TABLE 4
SPACE IN UNIVERSITY DEPARTMENTS (INCLUDING CIRCULATION AND TEACHING SPACE)

	No. of departments	Total area (sq. ft.)	Average area	Median area	Range
Medical schools	29	248,000	8,600	5,000	300-37,000
Pharmacy schools	13	56,000	4,300	5,000	1,000-11,000
Total	42	304,000	7,250	5,000	300-37,000

	Medical (sq. ft.)	Pharmacy (sq. ft.)	All departments (sq. ft.)
<i>Area per man for :</i>			
Established staff	1,610	920	1,414
Established and research staff	693	514	650
Undergraduates	82	64	78
All staff and undergraduates	74	57	70

TABLE 5
STAFF STRUCTURES

	Professors	Readers	Senior lecturers	Lecturers	Junior lecturers	Total
(a) <i>University departments</i> (42)						
Medical schools (29)	24	20	26	55	29	155
Pharmacy schools (13)	1	6	11	26	17	61
Total	25	26	37	81	46	216

15 Departments have both a professor and a reader

6 Departments have a reader but no professor

10 Departments have neither professor nor reader

13 Departments are not independent

(b) *Industry* (28) (approximate grading):

Heads	Senior officers	Officers	Junior officers	Total
16	50	145	12	223

TABLE 6
QUALIFICATIONS OF ESTABLISHED STAFF

	Medical	Pharmacy and other sciences
Universities: Medical schools	88	67
Pharmacy schools	4	57
Industry	18	205
Other units	10	24
Total	120	353

TABLE 7
APPOINTMENTS, LOSSES AND NET CHANGES IN ESTABLISHED STAFF DURING 1958-1963
Losses mean total losses from departments and include losses from the profession

	Appointments	Losses	Net gain	Gain per year	Gain per year per dept.
<i>Universities :</i>					
Medical schools (29)	128	65	63	13	0.45
Pharmacy schools (13)	75	28	47	9	0.69
Total (42)	203	93	110	22	0.52
<i>Industry</i> (28)	229	80	149	30	1.07
Total (70)	432	173	260	52	

tions must be made for circulation space, teaching rooms, offices, workshops, stores and various services. Similar deductions must be made in considering the room available for undergraduates.

Twelve teaching departments (including only 1 London medical school department) plan further increases in space, or staff.

STAFF STRUCTURE AND QUALIFICATIONS (Tables 5 and 6)

There is a considerable difference in structure between medical and pharmacy schools. In the former there were, roughly speaking, 1 professor for every 6 members of staff ; in pharmacy schools there was only 1 professor of pharmacology to about 60 staff. Even with medical schools, 5 departments out of 24 did not have a professor as head. Of the 13 departments which do not have an independent head, 12 come under Departments of Pharmacy in pharmacy schools, and 1 in a medical school comes under the Department of Physiology.

The qualifications in the returns were too diverse for analysis beyond the distinction between medical and other qualifications. But this is sufficient to show certain striking facts ; that only 25% of all pharmacologists have a medical qualification ; that about 75% of these are placed in medical schools ; and that less than 10% of staff in pharmacy schools or in industry have had a medical training.

APPOINTMENTS AND LOSSES

The turnover of staff in the last 6 years is shown in Table 7. All departments have increased in size, industry leading with a gain of 1.07 man per department per year followed by pharmacy schools with 0.69 and medical schools with 0.45. The appointments outnumber the losses by 2:1 in the universities and by nearly 3:1 in industry. The overall gain has been 260, giving an annual average of 52.

The losses are further analysed in Table 8. The two upper lines in the Table, losses abroad and "left pharmacology," are losses to the profession in Britain and number 14 per year. A minimum demand can be estimated from this loss together with the average annual gain to be: $16.8 + 52 = 68.8$. The rest of the losses, the 3rd line in Table 8, could represent losses from these departments to those not covered by the questionnaire, i.e., to clinical research units, non-pharmaceutical industry and administration, and thus may also cause vacancies. Thus a maximum demand might be computed from the total annual loss and the annual gain to be $34.6 + 52 = 86.6$. If other units are included, this figure rises to 93. Allowing for the errors inherent in this sort of calculation, an average yearly supply of 80-85 pharmacologists might have been enough during 1958-1963.

Tables 9 and 10 analyse the qualifications and sources of staff appointed during 1958-1963. These confirm the conclusions of Table 6 ; that those trained in medical schools for the most part take up posts in medical schools ; and that it falls to the pharmacy schools to fill most of the posts in pharmacy departments and in industry. It is also noteworthy that considerably fewer biochemists than physiologists or zoologists go into industry, and that considerably more go from medical schools into industry than vice versa.

TABLE 8
ANALYSIS OF LOSSES TO DEPARTMENTS DURING 1958-1963

	Medical schools	Pharmacy schools	Industry	Total	Total per year
<i>Cause of loss :</i>					
To established post abroad	12	5	12	29	5.8
Left pharmacology	17	5	33	55	11
Not investigated	36	18	35	89	17.8
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Total	65	28	80	173	34.6
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TABLE 9
SCIENTIFIC QUALIFICATIONS OF STAFF APPOINTED BETWEEN 1958 AND 1963

<i>Qualification in :</i>	Universities		Industry	Distribution of qualifications over all depts.
	Medical	Pharmacy		
Pharmacology	8	4	27	39 (9%)
Pharmacy	15	57	72	144 (33%)
Medicine	59	1	14	74 (17%)
Physiology	8	5	32	45 (10%)
Zoology	5	1	30	36 (8%)
Biochemistry	8	1	16	25 (6%)
Other subjects	12	1	16	29 (7%)
Multiple qualification	13	5	22	40 (9%)
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Total	128 (30%)	75 (17%)	229 (53%)	432
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TABLE 10
(a) SOURCES OF STAFF APPOINTED TO DEPARTMENTS IN INDUSTRY FROM ESTABLISHED POSTS ELSEWHERE BETWEEN 1958 AND 1963

	Industry
<i>Source :</i>	
University medical schools	21
Other university departments	24
Technical colleges	5
Industrial organizations	35
Abroad	10
Other sources	11
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Total	106
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(b) SOURCES OF ALL STAFF APPOINTED TO UNIVERSITY DEPARTMENTS BETWEEN 1958 AND 1963

	Medical schools	Pharmacy schools	Total
<i>Source :</i>			
University medical schools	60	5	65
Other university departments	36	19	55
Technical colleges	3	42	45
Industrial organizations	2	4	6
Abroad	10	1	11
Other sources	10	3	13
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Total	121	74	195
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TABLE 11
DURATION OF APPOINTMENTS OF ESTABLISHED STAFF

	Over 5½ years	2½–5½ years	2½ years and less
<i>Universities :</i>			
Medical schools	64	52	39
Pharmacy schools	13	24	24
<i>Industry</i>	32	60	131
Total	109	136	194

TABLE 12
LOSSES DURING 1958–1963, (a) OF THOSE IN POST IN 1958 AND (b) OF THOSE APPOINTED BETWEEN 1958 AND 1963

	(a)			(b)		
	Estimated staff numbers in 1958	No. lost 1958–63	% lost	Appointments 1958–63	No. lost 1958–63	% lost
Medical schools	87	22	25	128	43	33
Pharmacy schools	13	0	—	75	28	37
Industry	47	15	32	229	65	29

TABLE 13
ESTIMATED GROWTH OF DEPARTMENTS

	Estimated staff numbers in 1958	Staff numbers in 1964
Medical schools	87	155
Pharmacy schools	13	61
Industry	47	223

TABLE 14
UNDERGRADUATE COURSES OFFERED

B.Sc.	17	including Honours in Pharmacology 5, Physiology Special (London) 7
B.A.	2	
B.Pharm.	12	including B.Pharm. External (London) 7
Medical courses	27	including 3 dental courses
Diploma courses	11	including Qualifying Examination of the Pharmaceutical Society 6
Other courses	10	

TABLE 15
EXTENT AND TIMING OF PHARMACOLOGY TEACHING FOR MEDICAL STUDENTS

Number of schools	3	12	12
Total hours before "2nd M.B."	252	—	598
after "2nd M.B."	—	1,166	612
Average number of hours	84	97	101
Median	80	100	128
Range	72–100	30–150	78–200

Tables 11 and 12 throw some further light on turnover. Three examples may be quoted. First, whereas about half of the medical school staff have been appointed to their posts after 1958, in pharmacy schools and industry the proportion is over three quarters. Second, in pharmacy schools, although no losses from those already appointed by 1958 occurred during the next six years, a third of those appointed during 1958–63 left within these six years. Third, the proportion lost from medical schools and industrial departments is approximately the same for those appointed before or after 1958. In computing the figures for Table 12, all appointments made in 1964 have been omitted.

Table 13 provides estimates, using the data on gains and losses, of the staff positions in 1958, and hence of growth from 1958 to 1964. Medical school departments have grown a little less than 2-fold, industrial departments a little over 5-fold, and pharmacy school departments nearly 5-fold.

TRAINING

Tables 14 and 16 describe the courses available. Table 15 tabulates the differences in the teaching of medical students: most schools arrange for teaching either in both preclinical and clinical years, or in the clinical years only, and 3 arrange it wholly before the clinical years. On the other hand, however the teaching is timed, the average amount (roughly 90–100 hours) does not differ much, although the actual range is quite large, with one school giving only 30 hrs teaching after 2nd M.B. and another giving a total of 200 hrs before and after 2nd M.B.

Table 17 shows first the changes since 1952–3 in undergraduate numbers. Most striking, alongside a slow rise in medical students and B.Sc.'s, is a very large rise in numbers reading the B.Pharm. There has been an equally striking rise in the number taking an advanced degree, particularly the Ph.D. As a result the proportion of graduates to undergraduates has risen from 1:40 in 1952–3 to 1:16 in 1962–3.

Although these figures show that a considerable number of students receive advanced pharmacological training, it is well known that such graduates do not necessarily enter pharmacology as a career. For this reason those in university departments were asked to estimate how many of those trained by them were believed to have joined the profession. Since graduates often do not take the decision for some years, the estimate was asked for only the years 1952–3 and 1957–8. The result, 56 for 1952–3 and 77 for 1957–8, indicates a rise in entry slower than the rise in graduate students, but faster than the rise in undergraduate entry.

BALANCE OF SUPPLY AND DEMAND

From Tables 7 and 8 an estimate was made of the demand for pharmacologists over 1958–63, as between 69 and 93 per year. Table 17 showed that in 1957–8, 77 men were believed to have become professional pharmacologists, and if the rate of rise from 1952–3 were extrapolated, this would become 98 in 1962–3, giving a mean supply of 88 per year. But since both figures have appreciable potential error, it should be concluded, not that supply and demand are neatly balanced, but rather that they are not very far out of balance.

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TABLE 16
POSTGRADUATE COURSES OFFERED

Numbers of departments which, during any of the three years 1952-3, 1957-8, 1962-3, have had such postgraduate students

B.Sc.	M.Sc.	Ph.D.	M.D.	Other	No degree
5	16	28	10	8	8

TABLE 17
TRAINING AND RECRUITMENT IN PHARMACOLOGY DEPARTMENTS

Undergraduates per year :

	B.Sc.	B.A.	B.Pharm.	Medical	Others	Total
1952-3	86	17	209	2,379	517	3,114
1957-8	91	11	286	2,334	635	3,264
1962-3	119	34	517	2,531	622	3,728

Postgraduates :

	B.Sc.	M.Sc.	Ph.D.	M.D.	Others	No degree	Total
1952-3	5	6	43	1	14	9	78
1957-8	4	20	65	6	23	14	132
1962-3	6	23	124	18	44	21	236

Ratio of undergraduates to postgraduates :

1952-3	39.9
1957-8	24.7
1962-3	15.7

Numbers believed to have entered pharmacology as a profession :

	No.	% of all postgraduates in same year	% of all students (undergraduates and graduates) in same year
1952-3	56	72%	1.75%
1957-8	77	51%	2.3%

TABLE 18
VACANCIES AT MAY 1, 1964

	No.	% of total established staff	No. of applicants	Average duration of vacancy (months)
Universities	12	5.6	26	10.3
Industry	32	14.4		
Total	44	10.0		

TABLE 19
DIFFICULTY REPORTED IN RECRUITMENT

	Yes	No	No comment
Universities	67%	23%	10%
Industry	82%	18%	2%
Total	73%	21%	6%

Tables 18 and 19 give the evidence as to the actual state of the "market" in 1964. There were vacancies, mostly in industry, corresponding to about 10% of the total established staff and to about half the yearly appointment rate. For university posts there was an average of 2 applicants for each post, and the posts had been vacant for about 10 months. About three-quarters of departments reported difficulty in recruitment. If comparison is legitimate with the position nationally, where shortage of labour is widespread

at a job vacancy rate of under 2%, it appears that there is a substantial shortage of pharmacologists. The data above suggest, however, that it cannot have arisen suddenly, but has been gradually developing for some years. But it is clear, from the number of graduates trained, that supply could readily be increased if posts were both attractive and known to be so.

SUMMARY

1. The questionnaire was sent to 88 departments of pharmacology, including all those in medical and pharmacy schools, and industrial departments and certain other pharmacological departments with a member of the Society on their staff. All the questionnaires were returned. The returns refer to the position on May 1, 1964.

2. There were 473 pharmacologists in established posts; 155 in medical schools, 61 in pharmacy schools, 223 in industry and 34 in other units. In addition there were of research staff of all grades (including graduate students) 204 in medical schools and 48 in pharmacy schools, giving a total engaged in pharmacological work of 725.

3. The average university department had a staff of 5, with 6 research staff, and a gross floor area of 7,250 sq. ft. Departments varied considerably in staff from 1 to 11, and in gross area from less than 1,000 sq. ft. to over 20,000 sq. ft. The average student/staff ratio was about 1:18; but this teaching burden was lightened by the research staff, most of whom, although supported for the most part not by university but by outside funds, assisted with the teaching.

4. The average industrial department had an established staff of 8, but also varied considerably, from a staff of 1 to 23.

5. Of 29 medical schools 5 had no professor, and of 13 pharmacy schools 12 had no professor.

6. Medically trained pharmacologists for the most part take posts in medical schools. A proportion go into industry, but there is virtually no flow from industry back to the medical school. Only 25% of all pharmacologists were medically qualified, and less than 10% of the staff in pharmacy schools or in industry had a medical training. The pharmacy schools provide most of the staff for industry and for their own departments.

7. Between 1958 and 1963 appointments to departments exceeded losses to give a net gain of pharmacologists of 52 per year. The total demand over this period, covering both growth and losses, was estimated at 80–85 per year. Medical school departments have grown about 2-fold, industrial departments 5-fold and pharmacy school departments about 5-fold, between 1958 and 1964.

8. Alongside a more gradual rise in undergraduate numbers generally, there has been a large increase in numbers taking the B.Pharm. (from 209 in 1952–3 to 517 in 1962–3, compared with a 20% rise in total undergraduates over the same period). A similar rise, from 78 to 236, has occurred in postgraduate numbers, particularly in those taking the D.Phil. It is estimated that 56 entered pharmacology as a profession in 1952–3, and 77 in 1957–8.

9. Vacancies in pharmacology departments corresponded in 1964 to about 10% of the established staff, and three-quarters of the departments reported difficulty in recruitment.