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ABSTRACT

This study proposes that the Claremont Colleges establish a College of the Health Sciences. This college would admit students following their graduation from high school and grant the M.D. degree in 6 years. The curriculum that is proposed is constructed about a framework of human biology, an interdisciplinary program for the teaching of biology and the social sciences. As the student progresses through the curriculum, he would be exposed to the basic medical sciences through an organ-systems approach to teaching that provides for maximal integration of the disciplines. The curriculum that has been developed insures that adequate time is available for the student to gain a broad liberal education in the arts and humanities. It eliminates the redundancy in the teaching of the sciences fundamental to the education of a physician by avoiding the artificial discontinuity that frequently separates undergraduate premedical education from the early basic science years of medical school. (Author)

# A STUDY OF THE FEASIBILITY OF ESTABLISHING A COLLEGE OF THE HEALTH SCIENCES AT THE CLAREMONT COLLEGES

Supported by a grant from

the Commonwealth Fund

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# A STUDY OF THE FEASIBILITY OF ESTABLISHING A COLLEGE OF THE HEALTH SCIENCES AT THE CLAREMONT COLLEGES

by

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# I. INTRODUCTION

Medical education today is undergoing more constructive self-examination than it has since the Flexner report of 1910 and more than is going on in any other field of higher education. This is both impressive and commendable. The new medical schools recommended here can take advantage of the new ideas being born. Expansion of existing schools can provide opportunities for the new types of training for new types of doctors and support personnel now being envisioned. The medical profession as a whole is welcoming expansion of personnel and experimentation in training of personnel and delivery of health care as never before, to its great credit and the nation's great advantage; and the medical students of today encourage these progressive tendencies.

Quality and Equality: New Levels of Federal Responsibility for Higher Education

A Special Report and Recommendations by the Carnegie Commission on Higher Education, December 1968

For sixty years, medical education in the United States has followed precepts established by Abraham Flexner in 1910. Flexner stressed the need to bring medical education into the university environment. The need for a strong background in the basic physical and life sciences became translated into requirements for admission, transforming medical education into a "graduate" discipline. His call for the appointment of full-time faculty and encouragement of research were in marked contrast to the philosophy that governed the proprietary schools that flourished at that time.

The current ferment in medical education is a questioning of the emphasis that should be placed on these precepts. A number of study groups have recommended changes in the educational process. Most of the reports have emphasized the need to increase the output of physicians, educate more primary care physicians, find more economical ways to educate physicians, and achieve more diversity in the socioeconomic backgrounds of medical school graduates. These changes recognize growing deficiencies in the present health care system in the United States.

The disparity in the quality and availability of health care services in the United States is a complex problem in which changing attitudes toward careers in medicine and increasing the number of physicians are but two elements of the solution. Increasingly, academic medical centers are being asked to provide leadership in developing new approaches to the delivery of health care while maintaining their traditional role and principal function as institutions responsible for the education of health manpower.

Despite the attention being paid to the health care crisis, few institutions are moving aggressively to model new programs. It will clearly be some time before Congress presents a clear view of its intentions with respect to health care. Substantial and meaningful progress toward a different form of medical practice will be delayed until additional health manpower is available.

The goal of this study has been the definition of an academic program in medicine consistent with the character of the present complex of Colleges at Claremont and responsive to the changing needs in medical education.

Of importance to The Claremont Colleges at the present time is a general sense of the direction of medical practice and the needs to which educational programs in medicine should be responsive if appropriate societal needs are to be met.

The following trends in health care delivery can be observed:

1. In the future, increasing emphasis will be placed on ambulatory care to avoid the high costs of hospitalization and to reflect improved technology in medicine that enables many diagnostic procedures to be performed on the ambulatory patient.

2. Care will be delivered by a team approach that will utilize allied health professionals.

3. Primary care physicians will continue to be in great demand.

4. The historical trend toward group rather than solo practice by physicians will continue.

5. Major changes in the federal government's role in the financing of health care can be anticipated including the development of some form of national health insurance and a comprehensive prepaid health care plan.

These trends provide a general background for study of the feasibility of a health sciences program at The Claremont Colleges. Several options, consistent with the general philosophical principles underlying The Colleges' development, have been examined. These principles were outlined by Chancellor Bowen in the grant request to the Commonwealth Fund:

1. Any college established should be relatively small and should be collegial and personal in atmosphere.

2. Any activity of The Claremont Colleges should be marked by unimpeachable quality.

3. Any new enterprise of The Claremont Colleges should be innovative or pacesetting.

4. Any new activity should contribute significantly to the intellectual life of the entire Claremont academic community.

5. Any new activity should not drain away resources of the established Colleges but should draw new constituents and new revenues to Claremont.

This study proposes that The Claremont Colleges establish a College of the Health Sciences. This College would admit students following their graduation from high school and grant the M.D. degree in six years. The curriculum that is proposed is constructed about a framework of human biology, an interdisciplinary program for the teaching of biology and the social sciences. As the student progresses through the curriculum, he would be exposed to the basic medical sciences through an organ-systems approach to teaching, which provides for maximal integration of the disciplines. The curriculum that has been developed insures that adequate time is available for the student to gain a broad liberal education in the arts and humanities. It eliminates the redundancy in the teaching of the sciences fundamental to the education of a physician by avoiding the artificial discontinuity that frequently separates undergraduate premedical education from the early basic science years of medical school.

The advantages of human biology as the principal focus for the educational program of the College of the Health Sciences are several. Human biology as a discipline is now a creditable focus for general education. The past thirty years have witnessed a remarkable growth in research that deals with man himself; research that has been carried forward by the significant advances that have been made in general biology. Thus, the groundwork has been laid for a teaching program in the biological sciences that can have as its primary, although not exclusive emphasis, the human example. In addition, human biology is more meaningful to the future physician than traditional premedical studies because:

1. Human biology introduces the student to the social sciences at a time when he can incorporate their methodologies and approach to understanding human behavior into his approach to problem-solving in medicine.

2. To the extent that a human biology program attracts students with a diversity of career interests, the opportunity for development of a more common language among health professionals is enhanced.

A pioneering program in human biology with many of the characteristics that would be applicable to the proposed program at Claremont has been developed at Stanford University. Considerable discussion of the concept of human biology is presently taking place at Harvard, M.I.T., the University of Chicago, and Johns Hopkins.

The curriculum will encompass in a four-and-one-half-year period the course of studies normally followed by students in their four years of undergraduate education and first two years of medical school. The final one and one-half years provide exposure to the traditional clinical clerkships and opportunities for elective clinical experiences in areas of specialization.

The physician graduating from such a program would have a basic set of problem-solving skills in medicine, but he would not have undergone specialty differentiation. His specialization in, for example, family practice, surgery, or one of the medical specialties would generally occur after he had received the M.D. degree.

The program would minimize the expense to the student of studying medicine by reducing his formal educational experience to six years in contrast to the present eight years of undergraduate and medical school experience. A sound foundation in science would be assured by placing responsibility for the student's premedical and basic medical science education in one institution.

## II. BACKGROUND ON MEDICAL EDUCATION

Medical schools directly involve the academic institutions in the medical care service programs of the surrounding communities. The nature of this relationship to the community and the appropriate role of the medical school in the delivery of health care constitute one of the major issues confronting academic medical centers at this time. A second major issue is the degree to which medical schools develop programs to meet society's demand for particular types of physicians, e.g., primary care physicians.

A feasibility study for medical schools twenty, or even five, years ago might have avoided these two questions. During the past few years, however, many of the dogmas in medical education have been questioned. The Carnegie Commission on Higher Education, in its 1970 publication, Higher Education and the Nation's Health, challenged the homogeneous nature of medical school curricula and recommended immediate changes in medical education and in the way the medical schools meet societal needs. The report focused on the need for a number of medical school models with different educational missions.

Many of the similarities in the organization of medical schools and their curricula are the result of the schools' dependence on research funds as a means of underwriting growth. When large sums became available for research in the late 1950's and 1960's, through grant programs administered by the National Institutes of Health, the medical schools dramatically expanded their research activities. This occurred at a time when solutions to many of the fundamental enigmas of life systems appeared to be close at hand. A sympathetic Congress was persuaded that massive expenditures for basic research would lead to an understanding

of the causes of disease. It was this practical application of science that appealed to the Congress.

From 1950 to 1968, the size of most medical school faculties tripled, and expenditures for research by the medical schools increased tenfold. In both the basic science and clinical disciplines, it was common to find that the medical school faculty had grown to approximate the size of the medical student body. But few changes occurred in the organization of the institutions, for growth occurred by accretion of new programs and new personnel. Research funds sometimes dictated the development of programs in a manner totally unrelated to their educational value for the medical students. Any balance between research, teaching, and clinical service was lost. This lack of balance remains a fundamental issue in medical education today.

Federal support for biomedical research, after growing at an annual rate of 10-15% a year during the late 1950's and early 1960's, tapered off. It fell below 1968 levels in 1969, then rose slowly in 1970, and has remained relatively stable since then; the effect on the nation's medical schools, when large numbers of their faculties were unable to obtain federal grant support, was dramatic. By 1971, nearly two thirds of these schools were in financial difficulty; most were applying to the government for bail-out grants to maintain their operations. Many are still struggling to recover from the effects of having built their institutions on an unstable source of funding.

Another problem remains from the era of rapid expansion. With the financial support afforded biomedical research, the schools were able to offer ever more specialized education, taught by a faculty increasingly expert in highly specialized disciplines. The schools coped with the rapid growth of new knowledge by developing new disciplines and, in the area of clinical service, by developing new specialties. The specialty boards in internal medicine, surgery, and pediatrics required increasingly long training programs until it was the rule, rather than the exception, that the future physician's education would extend four or more years beyond receipt of the M.D. degree.

Although persuasive philosophical arguments were constructed to justify interdepartmental and conjoint teaching efforts in medical schools, most of the courses became more highly specialty oriented. In a system in which faculty advancement was based principally on productivity in research, there was little incentive to stimulate needed reforms in the teaching programs.

The isolation of the faculty members within their departments, which occurred as a result, and their general unwillingness to teach at a systems level that would encourage integration of knowledge, led to redundancy in the curriculum of the medical student. This redundancy was magnified for those students who entered medical school with considerable knowledge in the basic medical sciences. Few attempts have been made to adapt medical school teaching to the advanced programs of instruction now being offered in high schools and undergraduate colleges.

Heavy emphasis on research has also produced a confusion of goals in medical education--one group favoring continued expansion of research efforts and continued growth of specialty programs, the other favoring the development of educational programs that would produce more primary care physicians, the latter being coupled with an expansion of clinical service programs. Resolution of the health service needs is dependent on the health manpower available, hence the current heightened interest in increasing the output of physicians and allied health care personnel.

Manpower is the responsibility of the medical schools, and commissions examining this issue in the past few years have been unanimous in recommending that existing schools expand enrollment. They have also urged other changes--notably, that the curricula be shortened; however, the isolation of the medical school from the undergraduate campus works against the integration that is a necessary component of shortened programs.

Most medical educators now believe that three-year M.D. programs are feasible alternatives to the traditional four-year, postbaccalaureate program, provided the student is prepared for such an accelerated curric-

ulum by virtue of his educational accomplishments as an undergraduate. It clearly should not be viewed as the only pathway to attainment of the M.D. degree in the future. There is a risk that some schools will develop three-year programs by eliminating important elements of the basic medical sciences--a step that may limit the ability of the physician to understand future changes in the practice of medicine. For example, the idea that the needed grounding in basic medical sciences can be compressed into one year rather than two is unsound. It forecloses the future intellectual growth of the student by denying him basic problem-solving skills. Students without the necessary background in these sciences may well develop into physicians with almost programmed responses to clinical problems and little capacity for understanding new developments in medicine.

Medical schools will undoubtedly increase their production of new physicians. although serious questions must be raised about the approaches they are taking. How they respond to the demand that they take a greater part in health care delivery will have a strong impact on their ability to carry out their teaching and research responsibilities. When they expand clinical service programs, it can adversely affect the other two functions, just as the rapid expansion of research programs in the past decades has affected the quality of teaching and clinical service now available from the medical schools.

Strong departmental loyalties, developed under a system of competitive grant awards, have blocked many efforts toward interdisciplinary teaching programs. Further clinical service responsibility may further reinforce the autonomy of existing departments.

As they become involved in clinical service programs, medical schools will most likely undergo another period of growth. The growth will be supported by income provided for clinical service. The addition of new personnel with a distinctive mission parallels the pattern of growth that was underwritten by government grant support of biomedical research. But this time the principal function of the additional faculty will be clinical service. It may bring about a better balance of

functions within the institution (if numbers of faculty are accepted as the unit of measurement), but the risk is once more present that the growth of the institution will be supported by an unstable source of funding, and teaching may continue to receive a low priority.

Another troubling question for medical educators today is which deficiencies in our health care system can be corrected by changes in medical education. It must be emphasized that medical schools are being called on to provide the answers to an ever widening range of health care delivery problems that are the consequence not only of manpower shortages but also of the maldistribution of health care resources.

Comprehensive health care programs oriented to the prevention of illness rather than the treatment of disease are generally considered to be a desirable alternative to the type of medical care now commonly available in the United States. If schools assume responsibility for devising such models (Health Maintenance Organizations in the current jargon), there will be a need to expand markedly their ambulatory care programs. This, in turn, may require the development of clinical training programs in settings spatially removed from the acute care facilities which are presently used for training physicians. The concept of neighborhood or community health centers that make much greater use of allied health personnel than do most solo practitioners is receiving great public acceptance. The rational way for medical schools to teach the skills needed in the ambulatory care setting, including working with allied health personnel, is to participate in the development and staffing of the centers.

If they do, and if, as recommended, the clinics are financed by prepayment plans, there would undoubtedly be greater interest in developing training programs for primary care physicians. But until the medical schools grapple with the problems of developing systems of care, few role models will exist in the medical schools to influence students toward careers in anything but the specialty fields of medicine. Until the medical schools move away from the acute care facilities for instruction in clinical care, there is little reason to believe that students will

be exposed to a team approach in which tasks have been apportioned according to the skills and training of other kinds of health care personnel.

In summary, medical education is changing to meet the need for less expensive and less time-consuming educational programs; to provide educational experiences in the care of the ambulatory patient; and to develop physicians capable of delivering health care within the framework of a team effort. New types of affiliations with community service programs are needed to meet these changing educational goals.

The manner in which a school at Claremont might respond to this set of challenges is suggested in the following section.

## III. WHY BUILD A MEDICAL SCHOOL AT CLAREMONT?

> Nowhere else in the educational world are there so many and such radical discontinuities as there are in the education of a physician. One suspects that this must have an adverse effect upon the physician for it is difficult to see how a whole and integrated professional individual is likely to be produced by an educational process wholly lacking in continuity and coherence. There is further reason to suspect that a system of this character offers many possibilities of duplication of effort, lost motion, lost time, and general inefficiency.
>
> . A Rational Public Policy for Medical Education and its Financing
>
> A Report to the Board of Directors of The National Fund for Medical Education by John S. Millis

There are at least three reasons for establishing a new medical school in any location: to produce more physicians and research scientists; to obtain the services and improvement in health care that result from the school's conduct of clinical teaching programs; and to gain the new knowledge that results from the research efforts of the faculty.

How would these medical school products affect Claremont?

### Health Manpower and Health Care Delivery

There is little question that many parts of this country are not receiving adequate health care. The rural poor and urban ghetto dwellers have for some time been particularly underserved. Now middle-income groups

as well are finding it increasingly difficult to obtain health services. Several projections of the need for physicians have been made in recent years, and all suggest that the existing national shortage (approximately 50,000) will continue for the next twenty years.

Every new medical school, no matter what its program, increases the very scarce number of opportunities for students who wish to become physicians. Approximately 40,000 students applied for admission to first-year medical school classes that began in September 1972; approximately 13,000 were admitted. It is now expected (based on the number who have taken the Medical College Admission Test) that considerably more than 40,000 will apply for the 13,000 places in the coming year's entering classes. The quality of the applicant pool, as measured by academic achievement and performance on the Medical College Admission Test, is at a very high level. There is no doubt that many highly motivated, qualified students are denied admission each year.

The geographical area surrounding Claremont has an unmet demand for health care. It is becoming difficult to attract physicians into the communities surrounding The Colleges as the rate of economic growth in the area has slackened and the quality of the environment has deteriorated. The presence of a medical school will attract new physicians and inevitably improve the quality of health care in the surrounding communities. A medical school that is dedicated to an examination of innovative methods of health care delivery can address the question of how current shortages can be met.

Research

Research contributes to the development of a learning environment that assures that the students and faculty will understand the importance of incorporating new knowledge in their approach to clinical problems. It breeds a healthy skepticism of existing knowledge and a recognition of the constant need for a disciplined and reasoned approach to problem solving. Opportunities for research are essential to attracting a quality faculty and sustaining interest in expanding the fund of basic knowledge upon which decisions in clinical medicine are built.

At the present time the level of federal government support for biomedical research has stabilized. It exceeds a billion dollars a year, most of which goes to medical schools. Support for research in categorical areas, such as cancer and cardiovascular disease, on a mission-oriented basis, is also being discussed. The scope of the research activities envisioned for a new medical school is limited by recognition that support of research has stabilized.

The research activities of a medical school at Claremont, perhaps limited in scope in comparison with the research programs of most existing academic medical centers, could center on areas of special interest that already exist at The Colleges. Attractive opportunities for collaborative research include bioengineering, health economics, medical sociology, and health administration.

The Place to Innovate

If a program of medical education could be developed at The Claremont Colleges at less cost than the programs of existing medical schools without sacrificing quality, it would be a useful model for meeting the need to educate more physicians. Claremont has a tradition of quality and a willingness to innovate. The Colleges already possess many of the science resources needed to develop a program in human biology. Furthermore, the resources of a College of the Health Sciences would broaden the scientific base of the academic program of The Colleges.

# IV. OPTIONS IN MEDICAL EDUCATION AT CLAREMONT

Any one of a number of approaches to medical education might be developed at Claremont. Several are listed below together with a description of their advantages and disadvantages. The resources required to develop each type of medical education program depend upon the amount of cooperation between The Colleges and the proposed medical school, and also upon cooperative agreements the new school would make with hospitals and other institutions for clinical teaching experiences.

## Option A: Conventional Medical School

A three- to four-year postbaccalaureate program leading to the M.D. degree. This would follow the pattern of most existing medical schools. Of the new schools established in recent years, some have built university hospitals, others have relied upon affiliations with community-owned hospitals for their programs of clinical instruction. In either case, such a medical school usually develops a large faculty for teaching in the basic and clinical sciences. The number of faculty, quite independent of the number of students in the M.D. program, is largely determined by the extent to which the school depends upon research funds as a means of underwriting the development of the school, the breadth of the clinical service program, and the size of the house staff.

### Advantages

1. The school would be autonomous, free from any constraints imposed by The Claremont Colleges.
2. The educational program could be modeled after existing medical school programs, hence little effort would have to be expended to justify its educational purpose or approach.

3. The school would qualify for capitation* funding from federal and state governments.

Disadvantages

1. The high cost.
2. The likelihood that the large number of faculty, the large size of the facilities, and the necessarily graduate orientation of the program would make the school incompatible with the existing cluster of Colleges.
3. The failure to meet the need for educational reform in medicine.
4. The minimal value of such a program for the undergraduate students and faculty at the other Colleges.

Option B: Two-Year Basic Medical Sciences School

A medical curriculum that would terminate with instruction in the basic medical sciences. Clinical experiences would be limited in scope. Medical students would transfer to academic medical centers elsewhere for their final two years of medical school. There are two possible variations:

Variation B-1

A two-year program in basic medical sciences for students who enter after obtaining an undergraduate degree or after three years of undergraduate premedical education.

Advantages

1. The relatively low cost.
2. The program would not be dependent upon cooperative efforts with existing Colleges' programs.
3. The program would qualify for capitation funds from federal

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* The Comprehensive Health Manpower Act of 1971 provides for medical schools to receive funds from the federal government to partially meet the expense of medical education. The funds are awarded on the basis of a head count. A state program of capitation grants for increases in the number of students enrolled at private medical schools in California is also in effect.

and state governments.

4. Affiliations with existing community hospitals might be adequate to meet the needs for instruction in pathology and physical diagnosis.

Disadvantages

1. If the school were independent, there would be minimal benefit to the undergraduate Colleges from the presence of the medical school.
2. The school would be without a teaching hospital in which early clinical experiences could be assured.
3. The clinical departments would be small, making recruitment of clinical faculty difficult.
4. The artificial discontinuity in the medical education process would be emphasized.

It should be emphasized that educational programs in two-year medical schools tend to be extremely conservative. A major problem is developing curricula compatible with those of the schools to which the students transfer. Two-year schools can innovate in their programs of medical education only within very narrow limits, and it is difficult to see how they could respond to changing patterns of medical education, including the current emphasis on ways to shorten the educational process. Since the establishment of a two-year school would be viewed by most as anachronistic, it would not be easy to obtain funds from granting agencies.

Variation B-2

A two-year program in the basic medical sciences integrated with undergraduate programs in the sciences at The Colleges. The student would enter after graduation from high school, spend four years at The Colleges while concurrently enrolled in the medical school, and then transfer to a medical school elsewhere for clinical training. The educational format for such a program might be a curriculum in human biology.

Close cooperation between the sciences taught at the existing Colleges and instruction in the basic medical sciences at the two-year medical

school would be essential if the program were to expose the student to a proper balance of humanities and sciences in a four-year period. Major clinical facilities would not be required in such a program, but affiliations with hospitals and clinics in the area would be needed for instruction in pathology and physical diagnosis.

Advantages

1. Minimal cost.
2. Potential for meaningful interaction between The Colleges and the medical school.

Disadvantages

The program suffers from many of the disadvantages of Variation B-1 of this Option. The opportunity to develop a program in medical education that directly attacks the artificial discontinuities between the basic medical sciences and clinical disciplines would be foreclosed. Pressure would develop to convert the program into a complete program by addition of the clinical disciplines, as has occurred at Rutgers, Brown, Dartmouth, Michigan State, and Hawaii.

Option C: College of the Health Sciences

A seventh college with a more broadly defined mission than a medical school with emphasis on the health sciences. The College's educational purpose and goals would center on human biology. Students entering the College might pursue a variety of health careers after receiving the bacclaureate degree, one of which would be medicine. Other students might, for example, enter dentistry, veterinary medicine, or health care administration.

For those students whose initial interest in the health sciences developed into a career orientation in medicine, their undergraduate program would include instruction in humanities and sciences at the College of the Health Sciences and the existing Colleges. They would receive their M.D. degree from the College of the Health Sciences after completion of their clinical sciences education (the final two years of a conventional

medical school curriculum). The minimal time required for completion of the requirements for the M.D. degree would be six years after matriculation at the College of the Health Sciences.

Early years of instruction for the M.D. student would depend to some extent on existing course offerings of the other Colleges in the sciences and the humanities. Courses in human biology would be emphasized in the College of the Health Sciences to strengthen the bridges between the basic medical sciences and biology, chemistry, and physics. Particular emphasis would be placed on developing bridges between the behavioral sciences and the basic and clinical sciences of medicine.

Faculty would have to be recruited in human biology, a new discipline, as well as in the traditional medical sciences. The College would need to develop affiliations with hospitals in Claremont and Pomona sufficient to permit offering clinical clerkships.

If costs are to be minimized, close cooperation between the existing Colleges and the proposed College of the Health Sciences would be required. This important issue is discussed more fully below. The College's feasibility would be dependent in large part upon development of clinical teaching opportunities in the nearby community. (See Section VI: Clinical Teaching Facilities.)

Advantages

1. The educational program would treat the undergraduate education of the M.D. as a continuum. The discontinuity between the sciences taught in the undergraduate years and the basic sciences of medical school would be eliminated.
2. A general strengthening of the life sciences at Claremont would be possible.
3. Acceleration of the student's program in the undergraduate and medical school years would be possible without compromising the quality of the student's education.
4. The program would qualify for capitation funding from federal and state governments.

5. The program would be compatible with the constraints imposed by the cluster concept at Claremont and the changing nature of federal support for medical education and biomedical research.

Disadvantages

1. There would be a risk that the student would not be given an adequate opportunity to obtain a broad background in the arts and humanities. This risk is minimized by the interdisciplinary nature of human biology.
2. One of the objections raised regarding human biology programs is that the coverage of the life sciences is insufficiently rigorous. As the fund of knowledge in the life sciences has increased, the identification of a common body of knowledge essential to the education of the physician has become increasingly difficult. What is needed is an understanding of how problems in the life sciences are analyzed and solved.
3. Inherent in any accelerated program is the risk that the students entering the program have made premature career choices. This risk is minimized by the broad nature of the College of the Health Sciences' purpose and the opportunity for the student to transfer to one of the other Colleges.

## V. RECOMMENDATION: A CLAREMONT COLLEGE OF THE HEALTH SCIENCES

The Claremont Colleges should foster the development of a seventh college, a College of the Health Sciences. The College should develop a faculty of high quality, oriented to a program in human biology. Total enrollment should not exceed 600 students; the number of students completing the requirements for the M.D. degree would be 75 annually.

The academic program would include instruction in humanities and arts and some of the sciences at the other Colleges, thereby strengthening the life sciences at The Claremont Colleges.

### Why Human Biology?

Existing medical school curricula are often more a reflection of the historical events by which knowledge in the biological sciences was acquired than a result of careful analysis of current educational needs. At many schools, gross anatomy and histology still account for a considerable proportion of the teaching effort not because these disciplines are more important than other basic sciences but because they constituted one of the systematic bodies of knowledge available for instructional purposes in the early years of medical school development.

What has been lacking is a unifying principle in the education of the physician that would serve to judge the value of new and old material to the curriculum. This is not a problem confined to medical education, but it may be more acute in medicine because of faculty and student fears about the possible consequences if the student is inadequately prepared for his career. The fact that medicine deals directly with decisions that may be life-saving encourages conservatism in the curriculum.

Unfortunately, the conservatism may mask the lack of problem-solving approaches that the future physician will need to cope with the new and the unpredictable.

Why a Six-Year Program?

The idea that medical education should be considered a continuum meets with little resistance. Implementation of the concept is often extremely difficult because of the separate nature of most institutions responsible for premedical education and the medical school. It would seem that the concept of an educational continuum would be more easily achieved if there were a unifying educational framework that bridged the undergraduate premedical years and the years the student spends in medical school. There is a logical discontinuity that occurs at the time the student begins his clinical training in a specialty area. The discontinuity between the undergraduate and medical school years makes little sense and is the major cause of the redundancy in science teaching.

The six-year program of the proposed Claremont College of the Health Sciences, by integrating the medical student's education from the premedical years to the granting of the M.D. degree, would produce capable physicians in a significantly shorter time than is required by conventional programs without compromising the quality of the student's educational experience.

Human biology is used as a framework for course development in the early years of the program. An organ systems approach to teaching would constitute the middle or basic science years. Since the College of the Health Sciences is responsible for the entire six-year curriculum, clinical subject matter can easily be introduced to reinforce the principles that emerge in the sciences and humanities. An early introduction to clinical medicine, which is becoming common in most medical schools, enables the student to view his education as a whole and illustrates the close relationship between the knowledge and methodology of problem-solving in the basic sciences and the delivery of medical care.

With a curriculum centered on human biology in the early years,

the student gains an understanding of how health and sickness, and normal and abnormal behavior occur in man. This approach obligates the faculty to integrate the knowledge available from the life and social sciences. It could establish a point of view that would govern the future learning of the physician throughout his career.

The graduates of such a six-year program would not have embarked upon specialty training. They would, in a sense, be "undifferentiated," beginning specialty training in their postgraduate years. This would occur at other medical centers or community hospitals and would probably commence at the residency level. (Several of the specialty boards have already dropped internship requirements and it is anticipated that most free-standing internships will be phased out within the next several years. When this happens, students with the M.D. degree will enter postgraduate--that is, specialty--training for three or more years.) The total time between the student's entrance into the six-year program and the conclusion of his formal education would be a minimum of nine years.

This contrasts with the present requirements of four years of college education, four years of medical school, one year of internship, and three or more years of residency training. The three years that are saved would reduce the cost of educating a physician and lessen the financial burden on the student and his family. Economy is an important advantage of the six-year school.

Another advantage would be its ability to accept students with diverse backgrounds. There is an important need to improve the representation of minorities in careers in health and particularly the number practicing medicine. This program would provide these students, who frequently must cope with inadequate educational background, an opportunity to begin their studies in medicine before they are discouraged and disillusioned by the competition of the traditional premedical years. It may be necessary for them to obligate more than six years to meet the requirements for the M.D. degree. They will have the advantage of pursuing their studies in an environment that will demonstrate the

importance of the sciences in the prevention and treatment of illness.

Greater diversity in the interests and educational backgrounds of medical students would better match the diversity of career opportunities in medicine. For example, physicians with the skills and insights of the engineer, the sociologist, or the economist are greatly needed. The six-year College of the Health Sciences, because it starts with the freshman year in college, instead of four years later, would be better able than the traditional medical school to accept students with differing educational preparation and goals. Its overall approach is meant to be flexible enough to insure that many different kinds of students qualify for the M.D. degree.

Thus, although the basic suggested program is six years, it should be understood that some students would spend more than six years in the program either because their educational pathway requires the addition of courses in engineering or economics or other disciplines befitting their personal interests, or because they need to develop basic skills in the sciences that were not acquired in high school.

This program is based on the belief that medical education is best when the education of the physician is not hampered by artificial discontinuities imposed by the present patterns of organization of colleges and medical schools. By giving responsibility to one institution for the education of the student from the time of entrance into college until graduation from medical school, the most efficient use of the student's time and the maximum degree of flexibility are insured.

How Feasible Is This Approach?

The development of a College of the Health Sciences with these purposes raises many issues for The Colleges. The cost of medical education and the impact of a new College on the fund-raising efforts of The Colleges have been principal concerns.

The feasibility study has been conducted with the goal of identifying a more economical approach to medical education. The budget that has

been developed is the best means of judging whether this goal has been achieved. The inability to determine the nature of the fiscal relationships that the College of the Health Sciences would have with facilities providing clinical instruction is a handicap in determining the overall cost of the program. The financial aspects of the program are more thoroughly discussed later.

The possible consequences of a College of the Health Sciences on fund-raising by the other Colleges is difficult to predict. In general, it appears from past experience that new Colleges have strengthened the fund-raising capabilities of the existing Colleges.

It seems evident that aside from these issues there are two others that concern The Colleges' administrations and faculties at this time.

What is the Impact of Professional Education on The Colleges? — There is concern over the desirability of adding a professional school at The Colleges and how such a school might affect the relative emphasis on teaching and research. The emphasis on undergraduate education at The Colleges has been frequently stressed in discussions generated by the proposal to establish a medical school. Concern has been expressed that less attention would be paid to teaching undergraduate students if a professional program were developed. Any change in the emphasis placed on research also troubles some faculty. —

Medical education is not, in and of itself, graduate education. The proposal for an integrated six-year program recognizes the fact that the first two years of existing medical school programs represent an extension of teaching in the health related sciences that begins in the undergraduate years. The final years of medical school expose the student to problem-solving at the bedside. The awarding of the degree is an entry point to further training in areas of specialization, the graduate portion of medical education.

Most medical schools, in addition to programs in undergraduate medical education (i.e., pre-M.D. programs), have programs in the basic medical

sciences that award the Ph.D. degree. The College of the Health Sciences would serve as an important catalyst in the development of graduate programs in the life sciences at The Colleges. Other institutions, such as the City of Hope, might cooperate with the College of the Health Sciences to support high quality and balanced programs of graduate education in disciplines related to medicine. The problem of maintaining appropriate balance between the efforts of the faculty devoted to teaching Ph.D. candidates and M.D. candidates then becomes the important concern.

Graduate programs and research are important elements in the development, recruitment, and maintenace of a high quality faculty. It is important to insure that educational functions are not adversely influenced by undue emphasis on research or doctoral instruction. It is a question of balance that all too frequently has been determined by the availability of federal funds to support research and doctoral training programs. The insufficient attention given in the past to the detrimental effects of letting external sources of financial support determine the balance among programs can be avoided in the development of a new school. There is, after all, the advantage to a new school that it need not dismantle any existing programs to achieve better balance. The need to insure that adequate funds are available to maintain the autonomy of the academic program underlies the development of the budget for the College of the Health Sciences.

What Are the Prospects for Cooperation with the Other Claremont Colleges?

An equally important issue is the desirability of enhanced cooperation among The Colleges which would improve both the utilization of existing facilities and the breadth of offerings available to the students.

In The Claremont Colleges' system, which emphasizes autonomy, instruction is sometimes duplicated. In the case of the proposed College of the Health Sciences, would The Colleges' preference for autonomy permit the admission of medical students to courses in existing Colleges, for example, in chemistry and physics?

Two issues still need resolution:

1. Can a new school, in designing a curriculum, build upon the existing course offerings?

2. How can a College of the Health Sciences enrich the educational resources available to The Claremont Colleges?

It would be desirable to develop the College of the Health Sciences' faculty so that their interests would complement the science interests of faculty at the present Colleges and thereby strengthen and broaden educational programs in the life sciences. This has led to the incorporation within the budget developed for the College of the Health Sciences of funds to reimburse other Colleges for the instruction received by students enrolled in the College of the Health Sciences.

The Possibility for New Affiliations

Another form of cooperative relationship falls within the scope of this discussion. The Colleges might affiliate with the City of Hope which has an extensive biomedical science research program in addition to its programs of clinical service. From preliminary discussions with the City of Hope, it appears that they have faculty who might provide instruction in some areas of human biology. The present Executive Director of the City of Hope has expressed interest in an affiliation. He would favor limiting the scope of the medical education program to the prebaccalaureate and early basic medical science years. If such a program were developed, it would probably be necessary to develop a contractual agreement with a medical school to accept the students for their clinical training.

The Claremont Graduate School would be an important element in such an affiliation since its faculty would share responsibility with the City of Hope for developing Ph.D.-granting programs in the life sciences. Such programs would further strengthen science teaching at Claremont, and make possible the addition of faculty with science interests that complement areas of existing faculty interest.

A further refinement of this possibility is that one of the existing Colleges might sponsor a program in human biology and medicine. A likely candidate is Harvey Mudd College. A very good case can be made for such a cooperative approach involving Harvey Mudd and the City of Hope:

1. Harvey Mudd is interested in expanding its teaching in biology and has made a commitment to offer a premedical course of studies beginning in September 1973.

2. Facilities are available at Harvey Mudd that could house an expanded effort in biochemistry and the adjacent Joint Science Center could be utilized for teaching the biological disciplines. New facilities might be needed for laboratory instruction, but a major building effort would probably not be necessary.

3. The administrative costs of the program would be minimal. Furthermore, if Harvey Mudd, the Graduate School, and the City of Hope were partners in this development, little new faculty would have to be recruited. Harvey Mudd would develop a strong program in biochemistry and this, in turn, would be helpful to the City of Hope. The contributions to the program which would be made by the three institutions are shown in Appendix VI.

A joint program between Harvey Mudd College, the Claremont Graduate School, and the City of Hope would require a novel administrative structure to coordinate the educational program, but Claremont has been the scene of many novel administrative relationships.

# VI. CLINICAL TEACHING FACILITIES

A major unresolved issue is the development of clinical teaching facilities for the proposed Claremont College of the Health Sciences. It would be desirable to have them in close proximity to The Colleges. To separate physically the basic medical science and clinical faculty destroys the continuity of educational experience this program is designed to encourage.

Facilities for clinical education of the pre-M.D. student should be in keeping with the concept of graduating an undifferentiated physician and compatible with the need for more emphasis on ambulatory care. The clinical clerkships in internal medicine, surgery, and child health will continue to be used to introduce the student to clinical problem-solving and prepare him for future, more responsible, roles as a physician. This requires acute hospital beds and the continuous surveillance of the student's involvement in clinical care that is best achieved by house staff. A general rule of thumb is that a teaching program for medical students requires about four beds for each student in clinical training.* About 640 beds would be required for the proposed program at Claremont. They need not be in a single hospital. It is possible that fewer acute care beds would be required for teaching purposes if a workable plan for involving students in ambulatory care were developed. Although the clinical clerkship is an essential element in the education of the young physician, there should be more emphasis on the clinical skills involved in the care of the ambulatory patient.

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* Approximately 160 students in Years V and VI, as shown in Table III in Appendix II.

It is probably not feasible for the College of the Health Sciences to build a teaching hospital at Claremont. There is already an oversupply of hospital beds in the area surrounding The Colleges. More importantly, the cost of such a facility would be prohibitive for The Colleges. Concern has also been expressed regarding the impact a large teaching hospital located near The Colleges would have on the atmosphere of the campuses.

Although there are a number of relatively small community and proprietary hospitals in the Claremont-Pomona-Upland area that are within a short distance of The Colleges, none offers house staff training at this time. The lack of established postgraduate medical education programs at any of the existing adjacent hospitals may in the long run be an advantage, since it does not dictate the location of the College of the Health Sciences and permits the development of clinical service training programs unrestricted by tradition. For the immediate future, however, it constitutes the major constraint in the development of an M.D. degree granting program at The Claremont Colleges.

Clinical training programs could be developed at existing community hospitals. This would require the development of postgraduate education programs. Facilities would be required for educational purposes, for house staff quarters, and for meeting rooms. The College of the Health Sciences would have to conclude affiliation agreements with the hospitals to insure an adequate number of teaching patients.

The nearest existing large teaching centers are at U.S.C.-County Medical Center and Loma Linda. These institutions are from 35 to 60 minutes away from The Colleges by freeway. In the early years of the College of the Health Sciences' development, it is possible that arrangements could be made to provide some of the students' clinical education at these facilities.

Other possible solutions to the problem of obtaining clinical teaching facilities for the College of the Health Sciences also require further exploration. One is to seek assistance from the County of Los Angeles.

A County facility in the Pomona-Claremont region appears warranted to serve a growing indigent population who are unable to gain access to present beds in the area and consequently must travel 35 miles to the County Hospital in Los Angeles. The County has financed capital construction costs at the County Hospital and provides an operating budget for facilities which are administered and staffed by U.S.C. and U.C.L.A. medical schools. The difficulty with this approach is that there is no apparent need for additional hospital beds in the geographical area around Claremont. Present facilities report occupancy rates of 60-70%. An ambulatory care center is probably needed. A judgment on the type of County-supported facilities, if any, that could meet community needs should await an assessment of health care deficiencies in the area which will probably be undertaken in the near future.

Another approach is the development of a network of affiliated hospitals and other clinical care facilities that share a common purpose in providing service for the community and teaching opportunities for medical and paramedical students. The network could be organized as one element of an Area Health Education Center. A feasibility grant has been obtained from Regional Medical Programs to study the need for such a Center. This analysis will provide important information on medical care needs in this particular geographical area.

The development of a consortium of teaching hospitals within the Claremont area might lead to a more efficient utilization of existing health care facilities and prevent the unnecessary duplication of expensive specialty care units at all of the hospitals. If each hospital agreed to develop one or two specialty areas in depth, instead of trying to encompass all of them, excellent educational opportunities would become available. There would also be major benefits to the health of residents within the area.

An additional clinical resource in the area is the Kaiser Foundation and Medical Group at Fontana. It is the nearest hospital with an established house staff program and experience in undergraduate medical education. There are a number of ways in which Kaiser might affiliate with the

proposed College of the Health Sciences.

Kaiser might serve as a major teaching affiliate. Faculty would have appointments at both the College of the Health Sciences and at Kaiser, receiving a salary from the College in recognition of teaching effort and, as well, be partners in the Medical Group.

Alternatively, Kaiser might serve as an intermediary in the development of a health care program to meet the medical care needs of the medically indigent in the Pomona Valley-East San Gabriel Valley area. The principal source of funds for support of such a program would be Los Angeles County. The County's preliminary analysis suggests a need for about 200 hospital beds for indigent patients that live in the Pomona and East San Gabriel Valleys and presently utilize the U.S.C.-County medical complex. They also recognize a need for one or more ambulatory care centers in the same area. The County of Los Angeles and U.S.C. and U.C.L.A. have enjoyed a mutually beneficial partnership in the past. Kaiser might negotiate contracts with the County to meet health care needs of the indigent population with the understanding that one of the costs involved was the program's teaching costs. Kaiser and the College of the Health Sciences would then negotiate agreements to provide staffing for the clinical care program. The obvious advantage of this approach is the willingness of the County to absorb the teaching cost component of the clinical service program and the cost of capital construction in exchange for the willingness of the College of the Health Sciences and Kaiser to staff the clinical service programs.

An important question is who will pay for the teaching costs generated when educational programs are developed within hospitals. These costs are not trivial (a rough estimate is that a teaching hospital has a 20% increment in cost added to its budget) and can no longer be absorbed by hospital budgets already squeezed by very rapidly rising costs.

Whether these costs could be absorbed by the College of the Health Sciences depends largely on the manner in which income from the clinical services provided by the faculty is accounted for in hospital affiliation

agreements. Once again, one is faced with the difficulty of determining the magnitude of the cost problem or possible solutions to the problem without knowing the affiliations that could be concluded.

An Area Health Education Center, if one were established, might assume responsibility for allocating teaching funds made available from the federal government and, in this manner, have some influence on the types of appointments made by the hospitals. This might serve as an effective brake on needless duplication of highly trained personnel and expensive training programs in the community served by the Area Health Education Center.

There are many uncertainties, possibilities, and opportunities that need further exploration at this time. The best arrangement would be an affiliation that would permit the College of the Health Sciences' faculty to develop teaching opportunities in a clinical setting which is capable of responding to the rapid technological advances occurring in medicine and dedicated to seeking new approaches to the delivery of health care services. Either the County of Los Angeles or Kaiser could serve as a partner in such a clinical education program. Institutions with an interest in fostering an educational environment that will enable future physicians to be responsive to changing patterns of medical practice should be sought.

# APPENDIX I: CURRICULUM

Instruction in the humanities and arts could be taught by faculty of an independent College of the Health Sciences or by faculty of the other Claremont Colleges.

The science components of a curriculum for a College of the Health Sciences are outlined in Table I, which displays the science courses for each of the six years of the basic program and briefly outlines their content. These courses cover the subject areas that are essential to satisfaction of the requirements for the M.D. degree. The requirements may be met in several different ways, depending upon the degree to which courses in the present Colleges are incorporated into the curriculum of the College of the Health Sciences.

Table II describes the science instruction available at the other Colleges that would eliminate the need for development of duplicate science courses at the College of the Health Sciences.

## Table I

## Science Curriculum for an Independent College of the Health Sciences

| Year | Semester | Course | Content |
|---|---|---|---|
| I | 1st | Mathematics | |
| | | Combined physics and chemistry course | |
| | 2nd | (continuation of 1st semester courses) | |
| II | 1st | Human Biology I | Man and nature, origin and history of life, genetics, cell structure and function |
| | | Organic Biochemistry | Principles of organic chemistry, biochemistry |
| | 2nd | Human Biology II | Cell structure, molecular architecture, energetics of living systems, intercellular communication, development of nervous system |
| | | Organic Biochemistry | Principles of organic chemistry, biochemistry |
| III | 1st | Human Biology III | Man as an organism, development of man, adaptation, homeostasis |
| | | Neurosciences | Structure and function of nervous system, neurophysiology |
| | 2nd | Human Biology IV | Behavior as adaptation, human society |
| | | Introduction to Clinical Medicine I | History of medicine, concepts of health and well-being, economics of health care |
| IV | 1st | Organ Systems I | Renal metabolic system |
| | | Human Biology V | Abnormal behavior (Psychiatry) |
| | | Introduction to Clinical Medicine II | Patient interviewing, physical diagnosis, clinical medicine (in parallel with material being presented in Organ Systems I) |

Table I (continued)

| | | | |
|---|---|---|---|
| | 2nd | Human Biology VI | Economic and political aspects of human behavior, human sexuality |
| | | Organ Systems II | Cardiovascular and respiratory systems |
| | | Introduction to Clinical Medicine III | Clinical medicine (in parallel with material being presented in Organ Systems II) |
| V | 1st | Organ Systems III | Endocrine, reproductive, and hematopoetic systems |
| | | Introduction to Clinical Medicine IV | Clinical medicine (in parallel with teaching in Organ Systems III), continuation of physical diagnosis |
| | 2nd | Clinical Clerkships* | |
| Summer | | Clinical Clerkships* | |
| VI | 1st | Clinical Clerkships* | |
| | 2nd | Ambulatory Medicine | |
| | | Clinical electives | |

* These two semesters and the summer constitute the clinical clerkship year.

## Table II

## Science Curriculum for a College of the Health Sciences Incorporating Instruction at the Other Colleges

| Year | Semester | College of the Health Sciences | Harvey Mudd College | Pomona College | Joint Science Center |
|---|---|---|---|---|---|
| I | 1st | | Mathematics | Mathematics 30 | Mathematics 15 |
| | | | Natural Philosophy | Chemistry 1A | Chemistry 1[illegible] |
| | 2nd | | Mathematics | Mathematics 31 | Mathematics 15 |
| | | | Natural Philosophy | Chemistry 1B | Chemistry 15 |
| II | 1st | Human Biology I | | Physics 61A | Physics 33 |
| | | Organic Biochemistry | | | |
| | 2nd | Human Biology II | | Physics 61B | Physics 34 |
| | | Organic Biochemistry | | | |
| III - VI | | (as shown in Table I) | | | |

# APPENDIX II: STUDENTS

In keeping with the size of the student body at the existing Claremont Colleges, an eventual maximum enrollment of 600 students is proposed. Each year the entering class is assumed to be 125 students.

It is expected that the College of the Health Sciences would appeal to students with diverse backgrounds. Therefore, students from other schools would be encouraged to transfer into the College to fill vacancies that occurred. Students who entered the program later might spend more than six years (including their undergraduate experience at a predecessor school) to complete the requirements for the M.D. degree. Net attrition is reflected in the figures in Table III which shows decreases in the size of each class as it progresses through the program. The 24% attrition rate in the first four years falls between attrition rates reported by medical schools and those of most of the existing Colleges.

Students shown as enrolled in the College of the Health Sciences may be taking humanities and arts as well as introductory science courses at the other Colleges.

Table III

Student Enrollment at the College of the Health Sciences

| Year of Program | 1973-74 | 1974-75 | 1975-76 | 1976-77 | 1977-78 | 1978-79 | 1979-80 |
|---|---|---|---|---|---|---|---|
| First | 125 | 125 | 125 | 125 | 125 | 125 | 125 |
| Second | | 115 | 115 | 115 | 115 | 115 | 115 |
| Third | | | 105 | 105 | 105 | 105 | 105 |
| Fourth | | | | 95 | 95 | 95 | 95 |
| Fifth | | | | | 85 | 85 | 85 |
| Sixth | | | | | | 75* | 75* |
| Total | 125 | 240 | 345 | 440 | 525 | 600 | 600 |

* M.D. degree recipients.

# APPENDIX III: FACULTY

Table IV describes faculty requirements for an independent College of the Health Sciences providing instruction in all areas of the curriculum of its students.

Table V projects faculty development for a College of the Health Sciences if instruction in the humanities and arts and some of the premedical sciences were provided by the other Colleges.

Table IV

Faculty Size and Distribution at an Independent College of the Health Sciences*

| | Department Chairman | Professor | Associate Professor | Assistant Professor | Total |
|---|---|---|---|---|---|
| **Science** | | | | | |
| Mathematics and Computer Science | 1 | | 1 | 1 | 3 |
| Physics | 1 | | 1 | 1 | 3 |
| Subtotal | | | | | 6 |
| **Humanities and Social Sciences** | | | | | |
| Anthropology, Sociology, and Political Science | 1 | 1 | 1 | 1 | 4 |
| Economics | 1 | | 1 | 1 | 3 |
| English | 1 | 1 | | 1 | 3 |
| History | 1 | 1 | | 1 | 3 |
| Subtotal | | | | | 13 |
| **Basic Medical Sciences** | | | | | |
| Biochemistry | 1 | 3 | 3 | 2 | 9 |
| Biological Structure | 1 | 1 | 1 | 1 | 4 |
| Human Biology | 1 | 2 | 3 | 1 | 7 |
| Neurosciences | 1 | 1 | 1 | 1 | 4 |
| Pathology | 1 | 2 (+1) | 2 (+1) | 3 (+2) | 8 (+4) |
| Pharmacology | 1 | | 1 | 2 | 4 |
| Subtotal | | | | | 36 (+4) |

Table IV (continued)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Clinical Sciences | | | | | | | | | |
| Child and Maternal Health | 1 | 1 | (+1) | 1 | (+1) | 1 | (+2) | 4 | (+4) |
| Community Medicine | 1 | 1 | (+1) | | (+1) | 2 | (+1) | 4 | (+3) |
| Medicine | 1 | 3 | (+3) | 2 | (+3) | 4 | (+3) | 10 | (+9) |
| Psychiatry | 1 | 1 | (+1) | 2 | | 2 | (+2) | 6 | (+3) |
| Radiology | 1 | | | 1 | (+2) | 1 | (+1) | 3 | (+3) |
| Surgery | 1 | 1 | (+3) | 2 | (+3) | 4 | (+3) | 8 | (+9) |
| Subtotal | | | | | | | | 35 | (+31) |
| Total | | | | | | | | 90 | (+35) |



* Numbers in parentheses indicate community-based faculty paid by affiliated clinical institutions.

Table V

Faculty Size and Distribution at a College of the Health Sciences Whose Curriculum Incorporates Instruction at the Other Colleges*

| | Department Chairman | Professor | Associate Professor | Assistant Professor | Total |
|---|---|---|---|---|---|
| **Basic Medical Sciences** | | | | | |
| Biochemistry | 1 | 1 | 1 | 1 | 4 |
| Biological Structure | 1 | 1 | 1 | 1 | 4 |
| Human Biology | 1 | 1 | 2 | | 4 |
| Neurosciences | 1 | 1 | 1 | 1 | 4 |
| Pathology | 1 | 2 (+1) | 2 (+1) | 3 (+2) | 8 (+4) |
| Pharmacology | 1 | | 1 | 2 | 4 |
| Subtotal | | | | | 28 (+4) |
| **Clinical Sciences** | | | | | |
| Child and Maternal Health | 1 | 1 (+1) | 1 (+1) | 1 (+2) | 4 (+4) |
| Community Medicine | 1 | 1 (+1) | (+1) | 2 (+1) | 4 (+3) |
| Medicine | 1 | 3 (+3) | 2 (+3) | 4 (+3) | 10 (+9) |
| Psychiatry | 1 | (+1) | 1 | 2 (+2) | 4 (+3) |
| Radiology | 1 | | 1 (+2) | 1 (+1) | 3 (+3) |
| Surgery | 1 | 1 (+3) | 2 (+3) | 4 (+3) | 8 (+9) |
| Subtotal | | | | | 33 (+31) |
| **Total** | | | | | 61 (+35) |

* Numbers in parentheses indicate community-based faculty paid by affiliated clinical institutions.

# APPENDIX IV: FINANCES

Tables VI, VII, and VIII describe the operating budget for a College of the Health Sciences assuming that instruction in the humanities and arts and some of the premedical sciences is provided by the other Colleges. Table IX outlines the capital requirements for the construction program of such a College.

Table X summarizes the differences in operating expense and income and in capital requirements for construction that is estimated if a completely independent College of the Health Sciences is developed.

## Assumptions: Expense Projections

1. Inflation at 5% per year.

2. Faculty salary expense (on a strict, twelve-month, full-time system) is based on a report of the Association of American Medical Colleges on salary levels at Western medical schools in 1970-71.

3. 20% of all faculty salaries is charged against research grants.

4. Staff salary expense is based on current salary levels at The Colleges.

5. Multidisciplinary laboratories expense identified by reference to Multidiscipline Laboratories for Teaching the Medical Sciences by Frederick A. Fuhrman, Ph.D.

6. Student aid - see Appendix V.

7. Graduate program expense = income from training grants.

8. Sponsored direct research expense = income from research grants.

9. House staff expense based on number of house staff needed for the instructional program of medical students. Any additional house staff expense would be charged to affiliated community institutions.

10. Central service expense based on 1970-71 Combined Annual Financial Report of The Claremont Colleges. The expense computed for the College of the Health Sciences excludes Honnold Library costs since that has been computed independently. The fraction of the total cost of central services charged to the College of the Health Sciences is equal to the number of students enrolled in the College of the Health Sciences divided by the total enrollment of The Claremont Colleges.

Assumptions: Income Projections

1. Continuation of Commonwealth Grant.

2. Tuition = $2,500 per year in 1973-74, increasing by $100 per year.

3. Tuition income allocation:

| | |
|---|---|
| Students in Years I & II | 1/2 to The Claremont Colleges<br>1/2 to College of the Health Sciences |
| Students in Years III & IV | 1/5 to The Claremont Colleges<br>4/5 to College of the Health Sciences |
| Students in Years V & VI | All to College of the Health Sciences |

4. Federal capitation policy:*

| | |
|---|---|
| Students in Years I, II, III | No entitlement |
| Students in Years IV & V | $2,500 per student |
| Students in Year VI | $6,000 per student |

5. State contract policy:**

Rate = $12,000 per student less federal capitation payment

| | |
|---|---|
| Students in Years I, II, III | No entitlement |
| Students in Years IV & V | $9,500 per student |
| Students in Year VI | $6,000 per student |

6. Research grants derived principally from federal sources.

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* Under the Comprehensive Health Manpower Training Act of 1971. The amounts shown above are those authorized under existing law. In 1972-73 approximately 75% of the authorized amount was appropriated.

** Senate Bill #1284.

7. Overhead recovery = 40% of research grants.

8. Training grants derived from federal sources.

9. Student aid - see Appendix V.

10. No income from professional service is credited to the clinical faculty of the College of the Health Sciences.

Table VI

College of the Health Sciences Whose Curriculum Incorporates Instruction at the Other Colleges

Operating Expense, 1972-80

| | 1972-73 | 1973-74 | 1974-75 | 1975-76 | 1976-77 | 1977-78 | 1978-79 | 1979-80 |
|---|---|---|---|---|---|---|---|---|
| Administration | $115,900 | $424,080 | $501,447 | $521,451 | $554,572 | $584,465 | $611,563 | $644,889 |
| Salaries | | 927,642 | 1,841,822 | 2,458,504 | 2,700,786 | 2,854,773 | 2,981,568 | 3,143,551 |
| (Instruction by Other Colleges) | | (156,250) | (312,000) | (380,700) | (460,000) | (468,000) | (480,000) | (486,000) |
| Multidiscipline Laboratories | | 42,900 | 77,605 | 123,018 | 129,169 | 135,627 | 142,407 | 149,529 |
| Library | | 237,400 | 287,700 | 327,953 | 381,851 | 410,936 | 440,236 | 494,748 |
| Library - Back Acquisitions | | 200,000 | 200,000 | 200,000 | 200,000 | 100,000 | 100,000 | |
| Student Aid | | 127,500 | 243,000 | 313,000 | 377,000 | 405,000 | 430,000 | 430,000 |
| (Graduate Programs) | | (64,000) | (128,000) | (191,000) | (255,000) | (267,750) | (281,147) | (295,204) |
| Direct Sponsored Research Expense | | 550,000 | 1,125,000 | 1,400,000 | 1,500,000 | 1,525,000 | 1,525,000 | 1,525,000 |
| Plant Maintenance | 4,500 | 60,000 | 72,122 | 144,225 | 151,436 | 159,008 | 166,958 | 175,306 |
| House Staff | | | 106,099 | 212,198 | 335,100 | 470,250 | 493,762 | 518,450 |
| Central Services | | 92,765 | 182,632 | 269,470 | 352,366 | 433,410 | 510,580 | 536,108 |
| Total | $120,400 | $2,662,287 | $4,637,427 | $5,969,819 | $6,682,279 | $7,078,469 | $7,402,074 | $7,617,581 |

## Table VII

## College of the Health Sciences Whose Curriculum Incorporates Instruction at the Other Colleges

## Operating Income, 1972-80

| | 1972-73 | 1973-74 | 1974-75 | 1975-76 | 1976-77 | 1977-78 | 1978-79 | 1979-80 |
|---|---|---|---|---|---|---|---|---|
| Commonwealth Grant | $139,000 | $145,000 | | | | | | |
| Tuition - College of the Health Sciences | | 156,250 | $312,000 | $550,800 | $772,000 | $1,054,500 | $1,320,000 | $1,364,000 |
| (Tuition - Other Colleges) | | (156,250) | (312,000) | (380,700) | (460,000) | (468,000) | (480,000) | (486,000) |
| Federal Capitation | | | | | 237,500 | 450,000 | 900,000 | 900,000 |
| State Contract | | | | | 912,500 | 1,710,000 | 2,160,000 | 2,160,000 |
| Research Grants | | 550,000 | 1,125,000 | 1,400,000 | 1,500,000 | 1,525,000 | 1,525,000 | 1,525,000 |
| Overhead Recovery | | 220,000 | 450,000 | 560,000 | 600,000 | 610,000 | 610,000 | 610,000 |
| (Training Grants) | | (64,000) | (128,000) | (191,000) | (255,000) | (267,750) | (281,147) | (295,204) |
| Student Aid | | 46,875 | 90,000 | 129,375 | 190,875 | 253,175 | 305,407 | 305,407 |
| Total | $139,000 | $1,118,125 | $1,977,000 | $2,640,175 | $4,212,875 | $5,602,675 | $6,820,407 | $6,864,407 |

Table VIII

College of the Health Sciences Whose Curriculum Incorporates Instruction at the Other Colleges

Operating Deficit, 1972-80

| 1972-73 | 1973-74 | 1974-75 | 1975-76 | 1976-77 | 1977-78 | 1978-79 | 1979-80 |
|---|---|---|---|---|---|---|---|
| | $1,544,162 | $2,660,427 | $3,329,644 | $2,469,404 | $1,475,794 | $581,667 | $753,174 |

Total Cumulative Deficit = $12,814,272

## Table IX

## College of the Health Sciences

## Whose Curriculum Incorporates Instruction of the Other Colleges

## Capital Requirements for Construction

| | | |
|---|---|---|
| Administration | | |
| Central Administration | 6,000 | |
| Basic Sciences | 7,500 | |
| Clinical Sciences | 9,000 | 22,500 gross square feet |
| Laboratory Space | | |
| Multidiscipline Laboratories | 29,560 | |
| Basic Sciences Faculty | 33,000 | |
| Clinical Sciences Faculty | 15,000 | 77,560 |
| Instructional Space | | |
| Conference Rooms | 6,600 | |
| Lecture Halls | 15,000 | 21,600 |
| Library | | 25,000 |
| Vivarium | | 15,000 |
| Plant Maintenance, etc. | | 10,000 |
| Total Gross Square Footage | | 171,660 gross square feet |
| Total Construction Cost | | $12,874,500 |

## Table X

## Independent College of the Health Sciences

## Operating Budget and Capital Requirements for Construction

Annual operating expense in addition to that shown in Table VI:

| | |
|---|---|
| Faculty salaries | $ 512,900 |
| Administration | 60,000 |
| Institutional Costs | 60,000 |
| Maintenance, etc. | 23,250 |
| Total | $ 656,150 |

Annual operating income in addition to that shown in Table VII:

| | |
|---|---|
| Tuition allocated back to other Claremont Colleges when student enrollment equals 600 | $ 450,000 (approx.) |

Capital requirements for construction in addition to that shown in Table IX:

| | |
|---|---|
| 15,500 additional gross square feet | $1,162,500 |

# APPENDIX V: STUDENT FINANCIAL ASSISTANCE

The availability of student aid is an important consideration if the College of the Health Sciences is to recruit a diverse and talented student body. This appendix provides information on financial assistance (loans and grants) available to students enrolled in the M.D. degree granting program.

The favorable earnings position of physicians (coupled with the recent marked improvement in the compensation available to physicians in their early postgraduate years) makes feasible a financial assistance program that depends heavily upon loans.

This appendix analyzes the funds needed if one places greatest emphasis on grants during the first years of enrollment and on loans during the later years. This minimizes the risk that the student will attend school, accumulate a large debt, fail to graduate, and then incur difficulty in repaying his debt.

It is assumed that financial assistance will be made available on the basis of demonstrated financial need. Grants will be awarded to meet the student need that remains after he has borrowed a standard amount. The loan policy leads to a maximum indebtedness upon graduation of $13,500. This is a reasonable debt for a physician to repay in view of current earnings.

It has been assumed that two-thirds of the student body will require financial assistance and that average need is $3,000 per student during each of the student's first three years, and $3,500 per student during each of the student's last three years. The allocation of financial

assistance between grants and loans by year of enrollment would, on the average, be as shown below:

| Year of Enrollment | Grant | Loan | Total |
|---|---|---|---|
| First | $1,500 | $1,500 | $3,000 |
| Second | 1,500 | 1,500 | 3,000 |
| Third | 1,000 | 2,000 | 3,000 |
| Fourth | 1,000 | 2,500 | 3,500 |
| Fifth | 500 | 3,000 | 3,500 |
| Sixth | 500 | 3,000 | 3,500 |
| Total | $6,000 | $13,500 | $19,500 |

Sources of loans and grants, eligibility requirements, and probable funds available by source are described below.

Loans

1. Federally Insured Student Loan Program: It is assumed that each student will obtain the maximum allowable loan ($1,500) in each of his first three years and $1,000 from this source in each of his final three years.

2. Health Professions Student Loan Program: The amount of loan funds available through this federal program fluctuates. A "best guess" estimate has been made.

3. Other Sources: These would include the American Medical Association Education and Research Foundation Loan Program, the AMA-ERF Student Opportunity Loan Program, loan funds established by county medical societies, etc.

It is assumed that, in addition to FISL borrowing, each student would borrow $500 from the Health Professions Student Loan Program and/or other sources during his third year, $1,500 in his fourth year, and $2,000 in each of his last two years.

Grants

1. California State Scholarship Program: Grants to undergraduate students who are California residents. It is estimated that 25% of the students in Years I, II, and III will qualify for support, receiving an average award of $1,500 per year.

2. Health Professions Scholarship Program: Federal grants to medical students. No funds would be available until the fourth year of the College's operation, i.e., when the first students enter their medical school years. Total funds available annually = 10% x Number of medical students x $3,000.

3. National Medical Fellowships: Private foundation grants to minority medical students.

4. California State Fellowship Program: Grants to graduate and professional school students who are California residents. This is a new source of funds for medical students. Estimates of funds available from this source are probably conservative.

Table XI indicates the funds available to medical students in a College of the Health Sciences by source. The gap in grant funds would eventually be met by developing scholarship resources at the College of the Health Sciences. The full amount of the unmet need for grant funds has been entered as expense in the budgets that have been prepared.

The gap in funding for grants could be distributed as loans throughout the student body, resulting in an increase in loans for each student of approximately $250 per year or $1,500 over the six-year period. This would bring total indebtedness of each student to $15,000.

Table XI

Financial Assistance for Medical Students

Enrolled in a College of the Health Sciences

| | | | Loans | | | | Scholarships | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Total Students | Total Aid Needed | Total Loans Needed | Federal Insured Loans | Health Professions Loans | Other Loans | Total Scholarships Needed | California State Scholarships | Health Professions Scholarships | Nat'l. Medical Fellowships | California State Fellowships | Funds Needed From Operating Budget |
| 1973-74 | 85 | $255,000 | 127,500 | 127,500 | | | 127,500 | 40,875 | | | | 80,625 |
| 1974-75 | 162 | 486,000 | 243,000 | 243,000 | | | 243,000 | 90,000 | | | | 153,000 |
| 1975-76 | 232 | 696,000 | 383,000 | 348,000 | | 35,000 | 313,000 | 129,375 | | | | 183,625 |
| 1976-77 | 296 | 920,000 | 543,000 | 412,000 | 96,000 | 35,000 | 377,000 | 129,375 | 44,500 | 9,500 | 7,500 | 186,125 |
| 1977-78 | 352 | 1,116,000 | 711,000 | 468,000 | 208,000 | 35,000 | 405,000 | 129,375 | 90,800 | 18,000 | 15,000 | 151,825 |
| 1978-79 | 402 | 1,291,000 | 861,000 | 518,000 | 308,000 | 35,000 | 430,000 | 129,375 | 128,032 | 25,500 | 22,500 | 124,593 |
| 1979-80 | 402 | 1,291,000 | 861,000 | 518,000 | 308,000 | 35,000 | 430,000 | 129,375 | 128,032 | 25,500 | 22,500 | 124,593 |

## APPENDIX VI: A SPECIAL CASE - AFFILIATION WITH THE CITY OF HOPE

This appendix contains information on curriculum, faculty, and finances for a four-year College of the Health Sciences affiliated with the City of Hope and administered jointly by the City of Hope and an existing College, most likely Harvey Mudd. The projections are based on a division of departments between the two institutions as follows:

| Harvey Mudd | City of Hope |
|---|---|
| Biochemistry | Genetics |
| Biophysics | Medicine |
| Human Biology | Neurosciences |
| | Pathology |
| | Physiology |

Some thought will have to be given to the proper place for Psychiatry, either at the City of Hope or Claremont.

Teaching effort would be divided as follows:

| Harvey Mudd | Claremont Colleges | City of Hope |
|---|---|---|
| Biochemistry | Humanities | Basic Medical Sciences |
| Biophysics | Languages | Introduction to Clinical Medicine |
| Chemistry | Social Sciences | |
| Human Biology | | |
| Mathematics | | |

Subject matter taught would be distributed as follows:

| Year | Harvey Mudd | Other Colleges | City of Hope |
|---|---|---|---|
| I | Mathematics | Humanities | |
| | Introduction to Natural Philosophy | Electives | |
| II | Human Biology | Humanities | |
| | Biochemistry-Organic Chemistry | Electives | |
| III | Human Biology | | Human Biology-Basic Medical Sciences |
| | | | Introduction to Clinical Medicine |
| IV | | | Human Biology-Basic Medical Sciences |
| | | | Introduction to Clinical Medicine |
| | | | Physical Diagnosis |

Table XII estimates the faculty (in full-time equivalents) needed at Harvey Mudd and the City of Hop to support the teaching program that has been outlined. These estimates are the basis for calculating the financial projections that follow.

Tables XIII, XIV, and XV project the operating budget for a four-year College of the Health Sciences. Assumptions made in projecting income and expense are as indicated in Appendix IV. It is difficult to know whether it would be possible to obtain capitation funds from either state or federal sources to support the fourth year of this program. If it is possible, income from tuition and state and federal sources would be as shown in Table XVI.

Table XII

Faculty Size and Distribution in a Four-Year Human Biology Program

Of The Claremont Colleges and the City of Hope

| | Department Chairman | Professor | Associate Professor | Assistant Professor | Total |
|---|---|---|---|---|---|
| Harvey Mudd College | | | | | |
| Biochemistry | 1 | 1 | 2 | 2 | 6 |
| Biological Structure | 1 | 1 | 1 | 1 | 4 |
| Biophysics | 1 | 1 | | 1 | 3 |
| Human Biology | 1 | 1 | 2 | 2 | 6 |
| Subtotal | | | | | 19 |
| City of Hope* | | | | | |
| Genetics | 1 | 1 | | 1 | 3 |
| Medicine | 1 | 2 | 2 | 2 | 7 |
| Neurosciences | 1 | 1 | 1 | 1 | 4 |
| Pathology | 1 | 2 | 2 | 3 | 8 |
| Physiology | 1 | 2 | 1 | 1 | 5 |
| Subtotal | | | | | 27 |
| Total | | | | | 46 |

* The numbers are only suggestive of the faculty equivalents needed for teaching. Fifty percent of the staff at the City of Hope might qualify for an academic appointment at Harvey Mudd or the Graduate School.

Table XIII

Four-Year Human Biology Program

Operating Expense, 1972-80

| | 1972-73 | 1973-74 | 1974-75 | 1975-75 | 1976-77 | 1977-78 | 1978-79 | 1979-80 |
|---|---|---|---|---|---|---|---|---|
| Administration (Harvey Mudd) | $50,650 | $173,470 | $201,904 | $209,007 | $213,054 | $226,846 | $240,002 | $253,546 |
| Administration (City of Hope) | | 83,070 | 87,218 | 91,778 | 96,154 | 100,955 | 105,893 | 111,357 |
| Instruction (Harvey Mudd) | | 297,924 | 629,505 | 660,944 | 701,691 | 736,626 | 773,402 | 812,007 |
| Instruction (City of Hope) | | 127,001 | 238,410 | 291,545 | 308,430 | 328,341 | 339,937 | 359,342 |
| (Instruction by Other Colleges) | | (175,000) | (348,000) | (360,000) | (372,000) | (384,000) | (396,000) | (408,000) |
| Multidiscipline Laboratories (Harvey Mudd) | | 42,900 | 77,605 | 123,018 | 129,169 | 135,627 | 142,407 | 149,529 |
| Library (Harvey Mudd) | | 237,400 | 287,700 | 327,953 | 381,850 | 410,936 | 440,236 | 494,748 |
| Student aid (Harvey Mudd) | | 127,500 | 243,000 | 313,000 | 377,000 | 377,000 | 377,000 | 377,000 |
| (Graduate Programs) (Claremont Graduate School) | | (64,000) | (128,000) | (191,000) | (255,000) | (267,750) | (281,147) | (295,204) |
| Research (Harvey Mudd & Graduate School) | | 100,000 | 400,000 | 600,000 | 800,000 | 950,000 | 950,000 | 950,000 |
| Plant Maintenance (Harvey Mudd) | 2,250 | 30,000 | 36,061 | 72,113 | 75,718 | 79,504 | 83,479 | 87,653 |
| Central Services (Claremont Colleges) | | 92,765 | 182,632 | 269,470 | 352,366 | 433,410 | 510,580 | 536,108 |
| Total | $52,900 | $1,312,030 | $2,384,035 | $2,958,828 | $3,435,432 | $3,779,245 | $3,962,936 | $4,131,290 |

Table XIV

Four-Year Human Biology Program

Operating Income, 1972-80

| | 1972-73 | 1973-74 | 1974-75 | 1975-76 | 1976-77 | 1977-78 | 1978-79 | 1979-80 |
|---|---|---|---|---|---|---|---|---|
| Commonwealth Grant | $139,000 | $145,000 | | | | | | |
| Tuition - Human Biology Program | | 175,000 | $348,000 | $612,000 | $868,000 | $896,000 | $924,000 | $952,000 |
| (Tuition - Other Colleges) | | (175,000) | (348,000) | (360,000) | (372,000) | (384,000) | (396,000) | (408,000) |
| Federal Capitation | | | | | 237,500 | 237,500 | 237,500 | 237,500 |
| State Contract | | | | | 912,500 | 912,500 | 912,500 | 912,500 |
| Research Grants | | 100,000 | 400,000 | 600,000 | 800,000 | 950,000 | 950,000 | 950,000 |
| Overhead Recovery | | 40,000 | 160,000 | 240,000 | 320,000 | 380,000 | 380,000 | 380,000 |
| (Training Grants)* | | (64,000) | (128,000) | (191,000) | (255,000) | (267,750) | (281,147) | (295,204) |
| Student Aid | | 46,875 | 90,000 | 129,375 | 190,875 | 190,875 | 190,875 | 190,875 |
| Total | $139,000 | $506,875 | $998,000 | $1,581,375 | $3,328,875 | $3,566,875 | $3,594,875 | $3,622,875 |

*Fellowships to Ph.D. candidates in the life sciences at the Claremont Graduate School.

Table XV

Four-Year Human Biology Program

Operating Deficit, 1972-80

| 1972-73 | 1973-74 | 1974-75 | 1975-76 | 1976-77 | 1977-78 | 1978-79 | 1979-80 |
|---|---|---|---|---|---|---|---|
| | $805,155 | $1,386,035 | $1,377,453 | $106,557 | $212,370 | $368,061 | $508,415 |

Total Cumulative Deficit = $4,764,046

## Table XVI

## Four-Year Human Biology Program

## Income from Tuition, State, and Federal Sources

| Year | Tuition | Federal | State | Total | Funds to Other Colleges |
|---|---|---|---|---|---|
| 1973-74 | $ 175,000 | | | $ 175,000 | $ 175,000 |
| 1974-75 | 348,000 | | | 348,000 | 348,000 |
| 1975-76 | 612,000 | | | 612,000 | 417,000 |
| 1976-77 | 868,000 | $ 237,500 | $ 912,500 | 2,018,000 | 496,000 |
| 1977-78 | 896,000 | 237,500 | 912,500 | 2,046,000 | 512,000 |