light. In this case the effects are not additive, there being reversal.

To demonstrate conclusively that the time factor was the only one, it was necessary to secure an illumination independent of the electric spark, and of as short duration. This was accomplished in the following manner: A disc 30 cms. in diameter was furnished with a radial slit one millimeter wide near its periphery, and mounted on the shaft of a high speed electric motor. A second slit of equal width was arranged in a horizontal position close to the rim of the disc, in such a position that the two slits would be in coincidence once in every revolution. This second slit was cut in the wall of a vertical chute down which a photographic plate could be dropped. By means of a large convex lens of short focus an image of the crater of an arc-lamp was thrown on the point of coincidence of the slits. The intensity of the illumination transmitted by the slits when in coincidence was almost sufficient to char paper. The motor was then set in motion and a plate dropped down the chute. On developing this plate three images of the slit appeared, not at all overexposed, though the plate was the fastest on the market, and the intensity of the light while it lasted comparable to that at the focus of a burning glass. By measuring the distance between the images and the vertical distance through which the plate had fallen, it was an easy matter to calculate the speed of rotation, which was found to be 60 revolutions per second, the air friction of the disc preventing higher speed. The duration of the exposure will be the time occupied by the rim in traveling a distance equal to the width of the slit or 1 mm. This was found to be 1 / 55000 of a second about that of the spark. The crucial experiment now remained. A second plate was dropped and before development was exposed to the light of the candle. *The images of the slit were most beautifully reversed* except at the center where the light was too intense. A print from this plate is reproduced in Fig. 5. It seems then that we are justified in assuming that *the action of an intense light on a plate for a very brief time interval decreases the sensitiveness of the plate to light.* It is curious to contrast with this effect the fact that exposure to a dim light for a moment or two appears to increase the sensibility by doing the small amount of preliminary work on the molecules, which seems to be necessary before any change can be effected that will respond to the developer. I am not prepared to say what the nature of the change effected by the flash is. Possibly some one familiar with the theory of sensitive emulsions can answer the question. I have tried using polarized light for the reversing flash, and then fogging one-half of the plate with light polarized in the same plane, and other half with light polarized at right angles to it. As was to be expected there was no difference in the effects.

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PHYSICAL LABORATORY OF THE
UNIVERSITY OF WISCONSIN,
MADISON, Oct. 20, 1899.

ARCHITECTURAL PLANS FOR THE UNIVERSITY OF CALIFORNIA.

THE Phoebe A. Hearst International Competition for an Architectural plan for the University of California was closed on September 7th by the awarding of five prizes for the best plans. The first prize was awarded to M. E. Bénard, of Paris; the second to Messrs. Howells, Stokes & Hornbostel, of New York; the third to Messrs. Despradelle & Codman, of Boston; the fourth to Messrs. Howard & Cauldwell, of New York, and the fifth to Messrs. Lord, Hewlett & Hull, of New York.

From the outset of their inspection, the judges were attracted to the drawings which proved, after the awards had been made, to

be those of M. Bénard. The jury had laid down four propositions for their guidance in the determination of the relative merits of the plans. These propositions were:

1st. That the buildings should represent a university rather than a mere architectural composition.

preëminently above all others. The jurors were unanimously of the opinion that it fulfilled nearly every requirement that might be demanded.

The site of the University at Berkeley, which the architect might utilize, comprises some three hundred acres of land,

Fig. 1.—Perspective view of the plan for the University of California.

2d. That there should be a convenient grouping of the educational sections without undue crowding or prevention of possible future expansion.

3d. That the purpose of the several departments should be clearly defined in the design.

4th. That the architectural forms should be adapted to the configuration of the grounds and to the preservation of their natural beauties.

Judged by these standards M. Bénard's plan seemed to possess unquestioned superiority. Its great general beauty, its variety yet harmony of detail, its adaptability to the site, its convenience of arrangement, its flexibility and alterability in respect to individual buildings and to minor matters, and withal its permanent establishment of the great lines of its construction, placed it

rising at first in a gentle and then in a bolder slope from a height of about two hundred feet above the sea level, to one of over nine hundred feet. Its greatest length is east and west. The southeast corner has a grove of beautiful indigenous oaks and laurels. Two brooks, which meet in this grove, come the one from the southeast, and the other from the northeast. Along the lines of these streams are native trees, principally laurels and live oaks. The eastern limit consists of a plateau of nine hundred feet elevation. Behind this rises a range of hills, which a mile further back reaches an altitude of nearly two thousand feet.

M. Bénard's plan preserves the park in the southeast corner intact. Adjoining this on the north is his group of buildings for the fine arts, formed around what he calls

Fine Arts Square. These buildings are the Academy of Music at one corner; the great Auditorium or Hall of Ceremonies, at the second corner; the smaller Auditorium, or Lecture Hall or Theatre, at the third corner; and at the fourth corner the School of Fine Arts. Between the School of Fine Arts and the Academy of Music is the University Museum. This faces Fine Arts Square to the south. This square measures about six hundred feet each way. It connects, through a monumental arch balustrades, and grand flights of steps, with the natural park. The Museum is the most beautiful building in the entire scheme. Fine Arts Square, with its buildings of a public nature, occupies the position most accessible to the town and trains.

Lying east of this group is the great group of educational buildings, divided into three sub-groups. The first of these sub-groups comprises, chiefly, the Library and the Administration Building, facing each other on opposite sides of a great avenue, University Avenue, which entering the grounds at Fine Arts Square, runs east-

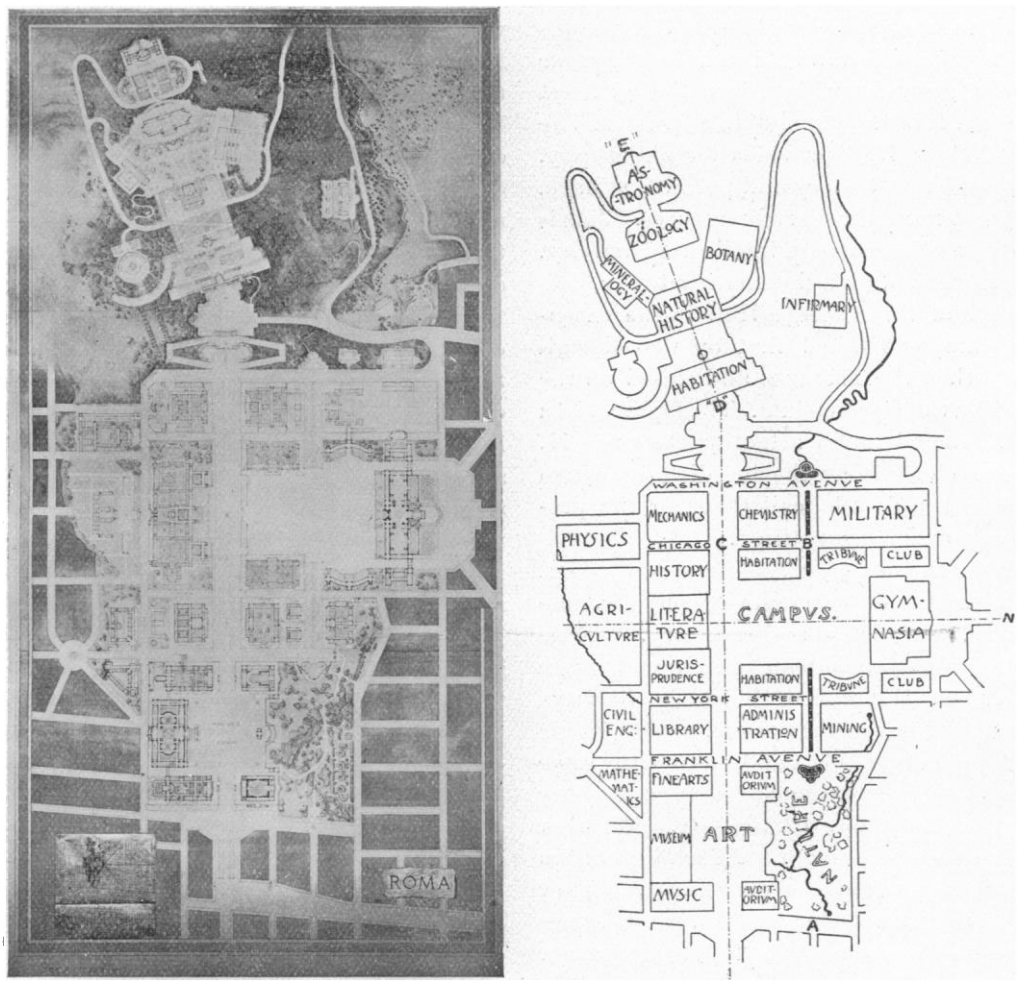

FIG. 2.—General plan and skeleton plan of buildings for the University of California.

ward till it reaches the steep ascent of the hills. The Library and Administration Buildings thus form a connection between the more public and the more private portions of the University.

The next sub-group is comprised of the principal college buildings, which we may call the College Hall or the Hall of the Humanities, two of the dormitories, the campus and the gymnasium. This occupies the space on the grounds which has the greatest breadth. It is monumental in character. The vast College Hall provides for philosophy, jurisprudence, history and political science, and ancient and modern literatures. This is treated as the centre of intellectual activity, and is marked by a dominating tower.

South of this College Hall is the extensive campus flanked first by two dormitories, then the Tribunes and closed on the south by the Gymnasium. The Gymnasium has attracted much attention, because M. Bénard chose it as the building in which to show the details called for in the programme of the competition.

The next sub-group lying east of the last, contains the departments of physics, mechanics, chemistry and military. These stretch along a plateau which will place them above the roofs of the college hall and other buildings of that group.

These groups of buildings, with some others to be mentioned later, cover the more gentle slopes of the site. We now come to a steep ascent. Near the bottom of this slope, above a garden, M. Bénard has placed two dormitories, and above these, a group comprising Zoology, Botany, Geology and Mineralogy and a Natural History Museum. And above all, crowning the landscape is the Astronomical Observatory.

In M. Bénard's scheme the building for Mathematics and Draughting is placed in a triangular spot behind the School of Fine Arts and adjacent to Civil Engineering, which is placed behind the Library. The Mining Building balances the Civil Engineering, by being placed behind the Administration Building. The Agricultural Department is placed in a field north of the main College Hall and increases the breadth of that magnificent group.

Now, it is to be said, that the location of the scientific departments will require in many cases to be changed or transposed. As they stand they indicate a fine conception on the part of M. Bénard, surrounding, buttressing and extending the educational domain. But he had naturally failed to observe the connection of related departments. Owing, however, to the flexibility of the plan, there will not be the slightest difficulty in making the modifications required.

Every building in the whole scheme is designed with a view to its use. The exterior architecture is simple or more or less ornate according to the purpose of the building. Each one asserts its identity by its appearance. Interiorily, again, they are arranged with the utmost precision in the ways indicated by the program. Lecture hall, laboratory, corridor, class-room, study, are all brought into proper relation.

With all the great number of buildings, and the size of them, there is no crowding. The two large spaces, the natural park and the campus, attest this. Besides, there are great longitudinal avenues, each with four rows of trees, and a third parallel avenue, four main cross avenues and numerous smaller streets and walks. The circulation is complete. Foliaged nooks and gardens abound. The whole scheme looks as free and open from a point of view of nature as it appears monumental from a point of view of architecture. M. Bénard has kept in mind, or has conceived unalterably, that he was designing a university, but that this university was a City of Learning.

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