Numbers 2 and 3 are living and Quaternary, and 5–9, inclusive, are Cretaceous (and Eocene) of Cooper's Catalogue.

Through him the medical profession of the west coast was first made acquainted with the mode of preparation and therapeutic effects of Mentel's aluminated solution, Pravoy's solution of perchloride of iron, Monrel's salt and the syrup of superphosphate of iron and its combinations; liquid propylamin, an antidote for rheumatism of the acute type, liquid rennet or pepsin wine for gastralgia, etc., and other valuable medicaments.

Among the plants, the virtues of which he either discovered or made known to the profession were yerba santa (*Eriodictyon*), for rheumatism, gout, etc.; *Damiana,* a nerve tonic and aphrodisiac; *Grindelia robusta* for oak or rhus poisoning and asthma, in certain cases; yarrow (*Achillea millifolium*), which he proved to be an efficient emmenagogue; canchelagua (*Erythræa,* of the West Coast), a bitter tonic and antifebrile; *Aspidium argutum* root (kidney fern), as an antidote for the tapeworm; manzanita leaves (*Arctostaphylos*) as an antilithic kidney and bladder tonic; and tincture of *Kalmia latifolia* as an extraordinary sedative, etc.

In 1858, when I made his acquaintance, he commenced the publication, in conjunction with Dr. David Wooster, of the *Pacific Medical and Surgical Journal,* which, after many years of conscientious and laborious editorial work, passed out of his hands into the charge of other members of the profession.

In the great struggle of the civil war for the preservation of the union, he followed the flag as assistant surgeon of volunteers. As a physician he was skillful, quick and accurate in diagnosis, prompt and resourceful in practise, quite free from the acquisitive instinct, and like his Oakland friend, Dr. Newcomb,[8] and his old-time friend and collaborator in the academy, Dr. Kellogg, from whom I have largely quoted, "earnest and generous hearted, ever ready to serve those who needed his services without money and without price, and ever ready to lend a helping hand or do a kindly deed."

I knew them well and I could relate many incidents of my own knowledge, illustrative of their goodness and benevolence. In the twilight of old age, looking back to those days of frequent and sympathetic contact, brought together as we were by similarity of tastes and habits of thought, memory recalls their generous natures and sterling qualities, and inspires the hope that these men may not be altogether forgotten.

ROBERT E. C. STEARNS
LOS ANGELES, CAL.

[8] Dr. Wesley Newcomb, born in the state of New York in 1808. He made Oakland his home in 1858, where he resided for about ten years. He is well known by his conchological writings, especially on the land shells (Achatinellidæ) of the Hawaiian Islands, where he practised medicine for five years. He died in Ithaca, N. Y., on January 26, 1892. See *The Nautilus,* Philadelphia, March, 1902.

SPECIAL ARTICLES

THE GRADING OF STUDENTS

THE problem of how students should be graded in order to make the results of grading equitable is of interest to the psychologist both as a theoretical and as a practical problem. Its practical aspect must be of the greatest importance to any teacher in any subject, in school or college. Professor W. S. Hall[1] published a paper on this subject a few years ago, the conclusion of which is that average classes of students, doing honest work and marked equitably, will yield results which when tabulated should conform to the binomial curve, *i. e.,* the number receiving medium marks should far exceed the number receiving high or low marks. The solution of the problem, then, consists merely in the fulfilment of two conditions, honesty on the part of the student and equity on the part of the instructor when applying the marks agreed upon by the faculty. Actually, however, the problem is still far from its solution.

[1] "A Guide to the Equitable Grading of Students," *School Science and Mathematics,* Smith & Turton, Chicago.

Professor Hall uses the marks AAA, AA, A, BB, B, CC, C, D, and E; nine marks in all. He does not tell us, however, how these marks are to be defined. The mere reference to a particular curve of distribution does not define the marks unless the difference of ability represented by each two adjoining marks is identical. But Professor Hall tells us that he does not regard them as identical. AAA he regards as equivalent to 99 to 100 per cent. Per cent. of what? He does not tell us. Of questions permitting only an affirmative or a negative answer and answered correctly in oral or written examinations? I am not sure that he means this exactly and exclusively, since he speaks also of the grading of laboratory note books. But I shall assume that he means the percentage of correctly answered questions. AA is regarded as standing for 95 to 99 per cent. The distance between the centers of the abilities AAA and AA is, therefore, 2.5. If we examine the other distances in the same manner we find them to be 4.5, 5, 5, 5, 5, 7.5 and 10. If the horizontal coördinate is divided by a scale of such unsymmetrical units, reference to a symmetrical curve has little meaning. It seems to me that the chief fact brought out in Professor Hall's paper is this: If a teacher, in grading his students, proceeds on the principle that the number receiving medium marks should far exceed the number receiving high or low marks, the accumulated results of his grading are likely to agree with his principle. But who would expect this to be otherwise? No one, however, will expect uniformity of grading in a whole institution to result from the fact that each teacher is guided by that principle, unless the various marks are defined. Is it possible to define the marks used, as standing for definite percentages of right answers? I do not believe, judging from my own experience in teaching, that students can be ranked by such a mechanical method. And if a teacher insisted on ranking them by such a method, he would often find that the result does not agree with Professor Hall's binomial curve. I tested the native musical ability of seventy-one students. The nature of the test

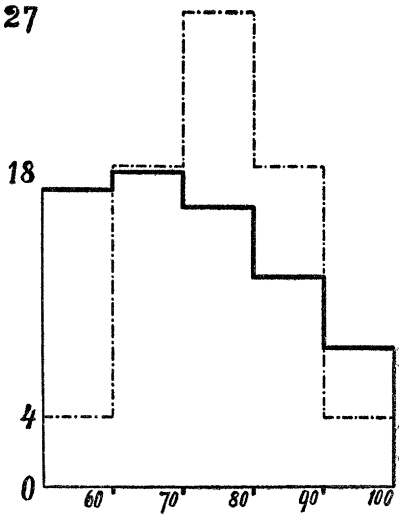

Fig. 1.

will be described elsewhere and its appropriateness demonstrated. The accompanying curve (Fig. 1) shows how the ability in question was *found* to be distributed (continuous line) and how it *should* be distributed according to Professor Hall (dotted line). There was in this case no distortion of the curve by either dishonesty of the students or any "personal equation" of the teacher. The grading consisted in the mechanical process of counting the right answers. Nothing is easier, of course, than to distribute the students in accordance with Professor Hall's curve, if we do what he has done and apply to the horizontal coördinate a scale of unequal units. But what is the use of it? Thus far I can not see any.

Five years ago the faculty of the University of Missouri voted that the grades of the institution should be A, B, C, D and E. What those grades should mean was left undefined, except that D and E were both called failures, with the distinction that D students were permitted to prepare privately for a second examination, and E students were not. It is highly interesting to see how the assumption that every teacher would know what the different grades stood for, has worked out in practise. I have collected the reports of forty teachers of the university during the last five years, all with two exceptions professors or

assistant professors, and most of them connected with the College of Arts and Science. The result of this investigation is that the experiment started by the faculty five years ago must be pronounced a complete failure. And both students and faculty have before now felt it to be a failure. There is no uniformity of grading, but the greatest divergence. It has come to be admitted openly that a student who is anxious to win honors must be careful to elect his work under certain teachers and avoid others as much as possible.

In order to compare the grading of the different teachers, I have divided the total number of the students of each teacher during the last five years into three groups, one representing the 50 per cent. medium students, one the 25 per cent. superior students and one the 25 per cent. inferior students. Classes of less than four students were not taken into account at all, because they would have unduly increased the coefficient of variability without signifying anything corresponding thereto. The percentages of grading, on the other hand, are not perceptibly changed by this omission. A few of the forty teachers are no longer connected with the university. The two classes of failures have been combined into one, marked F, because a number of the teachers do not make any use of the grade D, not wishing to express the privilege of reexamination in the grade, since the student's rank is

Teachers	25 Per Cent. Superior Students			50 Per Cent. Medium Students				25 Per Cent. Inferior Students			Total Number of Students	Number of Classes	Coefficients of Variability			
	A	*B*	*C*	*A*	*B*	*C*	*F*	*B*	*C*	*F*			*A*	*B*	*C*	*F*
Philosophy	25	—	—	30	20	—	—	13	10	2	623	29	.2	.3	.8	1.2
Latin I	25	—	—	27	23	—	—	19	6	—	130	9	.3	.3	1.2	—
Sociology	25	—	—	27	23	—	—	7	13	5	958	47	.3	.5	.9	.9
Mathematics I	25	—	—	15	31	4	—	—	12	13	208	19	.6	.6	.8	.9
Economics	25	—	—	14	36	—	—	1	19	5	461	28	.4	.4	.7	.9
Greek	25	—	—	14	26	10	—	—	14	11	287	30	.4	.4	.5	.9
Latin II	25	—	—	11	39	—	—	1	19	5	577	32	.6	.4	.6	1.0
French	25	—	—	11	29	10	—	—	15	10	295	16	.3	.4	.4	.9
Political Science	25	—	—	9	30	11	—	—	16	9	592	?	.3	.3	.3	.4
Mathematics II	25	—	—	7	29	14	—	—	9	15	145	10	.6	.4	.4	.9
German I	25	—	—	5	39	6	—	—	14	11	586	28	.6	.4	.6	.8
Psychology I	25	—	—	5	36	9	—	—	15	10	907	37	.5	.4	.5	.7
German II	25	—	—	1	38	11	—	—	14	11	941	35	.3	.2	.4	.4
Elocution	20	5	—	—	50	—	—	6	19	—	917	12	.5	.1	.5	—
Geology	22	3	—	—	45	5	—	—	17	8	293	?	.2	.2	.3	.2
History I	14	11	—	—	42	8	—	—	19	6	779	21	1.0	.2	.5	.8
Zoology I	21	4	—	—	41	9	—	—	19	6	479	19	.6	.3	.5	1.1
Psychology II	19	6	—	—	41	9	—	—	20	5	238	9	.4	.2	.3	1.1
History of Art	25	—	—	—	40	10	—	—	20	5	685	55	.5	.3	.3	1.1
Bacteriology	20	5	—	—	40	10	—	—	21	4	263	20	.5	.4	.6	1.2
Freehand Drawing	18	7	—	—	40	10	—	—	15	10	506	32	.8	.3	.4	.9
Chemistry I	23	2	—	—	38	12	—	—	19	6	205	16	.4	.3	.4	.7
English I	21	4	—	—	37	13	—	—	17	8	964	33	.7	.3	.4	.8
Astronomy	13	12	—	—	37	13	—	—	20	5	225	17	.5	.3	.4	1.4
History II	11	14	—	—	37	13	—	—	20	5	806	35	.7	.2	.3	1.0
Zoology II	24	1	—	—	36	14	—	—	17	8	250	?	.6	.3	.4	1.0
German III	22	3	—	—	34	16	—	—	12	13	441	26	.6	.6	.4	.8
Chemistry II	9	16	—	—	32	18	—	—	25	—	21	4	1.4	.6	.5	—
Education	18	7	—	—	31	19	—	—	16	9	266	12	.5	.3	.2	.7
Mathematics III	19	6	—	—	30	20	—	—	6	19	182	10	.4	.3	.3	.4
Mathematics IV	25	—	—	—	29	21	—	—	15	10	380	24	.4	.3	.3	.7
Physiology	20	5	—	—	28	22	—	—	18	7	426	30	.9	.3	.3	1.1
Anatomy	19	6	—	—	28	22	—	—	14	11	544	25	.6	.3	.3	.8
Mathematics V	16	9	—	—	25	25	—	—	10	15	209	10	.4	.3	.2	.4
Engineering I	13	12	—	—	24	26	—	—	16	9	813	39	.6	.3	.2	1.0
Mechanical Drawing	18	7	—	—	22	28	—	—	13	12	558	28	.4	.4	.3	.9
Mechanics	18	7	—	—	19	31	—	—	11	14	495	12	1.1	.3	.3	.4
Engineering II	16	9	—	—	17	33	—	—	13	12	826	?	.3	.3	.3	.9
English II	9	16	—	—	12	35	3	—	—	25	1098	44	.8	.3	.3	.4
Chemistry III	1	11	13	—	—	47	3	—	—	25	1903	12	1.0	.6	.1	.3

not the exclusive condition on which the possibility of reexamination depends.

To eliminate as much as possible the personal element from the publication of the results of this investigation, I have not given the names of the teachers, but only the subjects taught, and in the case of several teachers of the same subject I have added Roman numerals for distinction. For the student of similar phenomena I have added the total number of records of each teacher, the number of classes, in order to indicate the average size of the classes, and the coefficients of variability. In the first case of the table the average total per cent. of A's is given as 55 and the coefficient as .2. This means that in a class of 100 students of this teacher it is just as probable that the number of A's will be between 44 and 66 as it is that the number of A's will be outside of these limits; and that it is three times as probable that the number of A's will be less than 66 per cent. as it is that it will be more. In the last case of the table the total percentage of A's is 1 and the coefficient 1. This means that it is three times as probable that in a class of one hundred there will be one or two A's as it is that there will be none.

Let any one look over the four columns of the 50 per cent. medium students and ask himself if he can see uniformity of grading. Above we see that none of the students of medium ability receive the grades of C or F, but all receive either A or B. Below we see that none of the students of medium ability receive the grades of A or B, but all receive either C or F. And yet, on the basis of these grades the faculty gives "honors," returns to their parents students who have "accumulated failures," compels students to take twice the same work if this happens to be required for graduation, and prevents students from taking up work in departments to which they are drawn by their natural inclinations and from which they might derive the greatest benefit for their later life. But let no one think that this proves that the University of Missouri is in a pretty bad shape. It is not likely that other institutions are better off. Only, no one has investigated the matter. Education is just beginning to realize that it is not merely an art, but an applied science.

Can anything be done to make such inequalities of grading impossible? There is no reason why one should believe that this could not be accomplished. I shall outline a method by which one might proceed.

It seems plausible to start from the assumption that the combined mental and moral ability which we want to measure is distributed among different people in accordance with the probability curve which describes, *e. g.*, the distribution of accidental errors in scientific observation. Fig. 2 shows such a curve. The

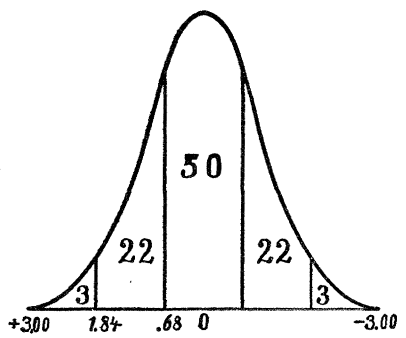

Fig. 2.

total area enclosed represents one hundred students making up the membership of a particular class. The first problem which confronts us is the division of this area. It seems best not to proceed entirely arbitrarily in this division, but to follow the custom already established. Whenever this curve is used for scientific purposes, its area is divided by verticals in such a manner that a middle area is cut out which is equal to the sum of the two areas left at the sides. The significance of this division is this: If we pick out a student at random from a crowd of one hundred, the chances are the same that we shall have a student of medium ability as that we shall have one who is not of medium ability. If the latter happens to be the case, he may be either a superior or an inferior student. Before we discuss the problem of further division, let us give an answer to the

question to which of these groups of students the methods of teaching and of maintaining discipline should be adapted. Plainly to the 50 per cent. of medium students. If these are taught in such a way that they are able to grasp what is presented, the superior ones will take care of themselves, and a large percentage of the 25 inferior ones will derive considerable benefit from the instruction. The same holds true for the method of maintaining discipline, of insuring the necessary regularity and intensity of intellectual work in class and at home.

If these assumptions are made, it follows that in no case should the *highest* grade established in any institution be given to more than 25 per cent. of the students of a class on the average of a number of years. The *highest* grade, if there is any difference of grades at all, must mean distinction. But it ceases to have this meaning if it can be obtained by a student of medium ability. We have seen above that a large percentage of the medium students have been able to obtain the grade of distinction. This fact may be explained by the teachers who are responsible for it in two ways.

1. A teacher may be guided by the conviction that the very fact of a student electing his work under his instruction proves that he is a superior student and that he ought to obtain a grade higher than the average grade. The absurdity of this assumption can easily be shown. In order to show this it is by no means necessary to put all studies on the same level, in our opinion. Some may be more valuable, some may be more difficult, than others. But to decide this is not the teacher's task when he grades his students. If a student excels, this means, of course, that he excels among the students who are taking the same instruction which he is taking. An analogous case in the broader life of a nation will make this still more clear. If we say that a certain physicist is a distinguished scientist of the country to which he belongs, we do not mean that he ranks high among botanists, physiologists and geologists, but that he ranks high among the physicists. Important suggestions towards the solution of problems of this kind may be found in Professor Cattell's paper on "American Men of Science." In the same way, when a student is ranked as a superior student by his Latin teacher, this can mean only that he does better work than 75 per cent. of the students in Latin. Whether he is more intelligent than 75 per cent. of all the students in the institution is a question which his Latin teacher is not called upon to answer, and which not even the scientist to whose domain this question belongs, the psychologist, is able to answer at present, and, possibly, will never be able to answer. It can not even be said, in justification of giving the highest grade to students of the middle 50 per cent. group, that most of the students taking work under this special teacher are doing advanced work, and that this fact proves that they are superior students. If this argument were admissible higher grades would have to be used in college than in the high school, and here again higher grades than in the elementary school. If a student is said by his teacher of comparative philology to have distinguished himself, this can mean only that he has distinguished himself among the students who are taking work in comparative philology, and not that he ranks high among students taking first-year Latin.

2. A teacher may say that by accident he happened to have unusually good students. This is a sufficient explanation for giving students of a rather small class in a special year unusually high grades. But it is the very nature of an accident that it occurs but rarely. If a teacher feels that he should give six of ten students the highest grade, he should first ask himself if these students are so extraordinary that not in ten or twenty years is such a good class likely to be found again. If he does not feel that this is probable, he can not justify giving a majority of the class the highest grade. They ought to receive the second grade, however satisfactory their work may have been. They have no claim on the grade of distinction. Under no circumstances, therefore, can a teacher justify his grading if it is found that of the total

number of students having taken work under him during a number of years, some of the 50 per cent. medium students have received the highest grade.

Let us now consider the 25 per cent. inferior students. If most or all of these students fail under a particular teacher, there may be but little objection. But if we find, as we actually do, that even some of the medium students fail, we have the right to conclude that the educational principles of the teacher are unsound. Either his methods of teaching and of maintaining discipline are defective, are not adapted to the medium group of students, or his conception of what a student ought to accomplish is altogether one-sided. If a student of chemistry wants to pursue advanced courses in chemistry, it may be necessary that he have a better knowledge of elementary chemistry than the seventy-fifth in a series of a hundred can obtain. This is a matter to be decided between the teacher of chemistry and the student. But it is not a sufficient reason for regarding the student's work as a failure. He may have acquired a sufficient knowledge of chemistry to take up, say, elementary work in botany. It is the teacher of botany who should decide *how much* knowledge of chemistry his student ought to possess. But if the teacher of chemistry grades the work of a student of the medium group as a failure and compels the student to take the work over, he does injustice not only to the student, but also to the teacher of botany, he encroaches upon ground where not he, but his colleague of another department, has jurisdiction. It is no more justifiable to grade 25 per cent. or more of the students as failures than to give 25 per cent. or more the highest grade. Still another argument might be offered by a teacher who grades students of the group of the medium 50 per cent. as failures, in justification of his habits. The teacher of English, for example, may say that students are so poorly prepared in English that more than 25 per cent. ought to fail, ought to be made to take the course a second time. But the teacher, in grading thus, usurps a right which legitimately is not his. If the students are not sufficiently prepared in some lines, he ought to persuade those who are responsible for the entrance requirements that these requirements must be changed, must be raised in some respects. But if the students are once admitted to college, the teacher of a particular subject has to accept them and adjust his methods of instruction and grading to the medium group. He has no right to establish arbitrary standards for the classes which he teaches himself.

We have divided all students taking a particular kind of work into three groups, medium students, inferior students and superior students. Should we subdivide these groups?

Little can be said in favor of subdividing the medium group. That this group is the largest, is, in itself, no reason for subdividing it. A strong argument against subdivision is the fact that this would bring about unjust grading of a large number of students. The curve is highest for medium ability. If we divide the area by a vertical line, we must have a large number of students on one side differing by an almost infinitesimal amount of ability from a large number on the other side. If the teacher, nevertheless, has to give them different grades, the probability is that a considerable number will receive grades either too high or too low. This probability of injustice must be avoided as much as possible. It can be largely avoided if we make subdivisions only where the curve is comparatively low; and it is best, therefore, to give all the students within the central area of 50 per cent. the same grade. This conclusion differs slightly from that of Professor Cattell in his discussion of the same problem.[1] He places only 40 per cent. in the central group. His reason is that otherwise it would not be possible to have each grade represent the same *range* of different abilities and, at the same time, to comply for the sake of conservatism with the custom of having as many as 10 per cent. students receiving the highest grade. Now, as the table shows, this custom does not exist in the University of Missouri, where cus-

[1] "Examinations, Grades and Credits," *Popular Science Monthly*, February, 1905.

tomarily about 25 per cent. receive the highest grade. And to comply with *this* custom would mean more conservatism than one can be expected to possess. On the other hand, equal range of abilities for all grades is impossible, since the probability curve extends infinitely in both directions of the central point, so that the range of the lowest and of the highest grade must always—theoretically at least—be infinite. It further seems to me of more importance that the distances between the *average abilities* of the groups (represented by the position of the geometrical center of the group) be approximately the same than that the ranges be the same. I shall make use of this principle later on. Taking all these conditions into account, I am inclined to prefer 50 per cent. for the central group.

More advisable than a division of the medium group of students seems a subdivision in the group of superior students. To belong to the group of the 25 per cent. best is not a great distinction. It would be well, therefore, to separate from the group those who possess unusual ability. The manner of subdividing the group is a matter of convenience. We may proceed in the following way. In the probability curve (Fig. 2) the point of extreme ability, where the height of the curve is practically zero, is chosen as 3. The point of the vertical line which separates the superior from the medium students is then .68, as can be read off from any table containing the values of the probability integral. It suggests itself to divide the ability-difference between this point and the extreme point, 3, into two equal parts. The result of this division is the point 1.84. To the left of this point are then found 3 per cent. of all the students, as can again be read off from any table of the probability integral. We have thus divided the group into two parts in such a way that the best possible student is as much better than the best student of the second class, as this one is better than the best of the medium class. Let us, then, call the 3 per cent. just separated by the name of "excellent" and retain the name of "superior" for the 22 per cent. following.

In the same manner we may subdivide the group of inferior students, calling the 3 per cent. worst "failures" and retaining the name of "inferior" for the other 22 per cent.

I expect to meet with opposition when I restrict failures to such a small percentage. But I believe that 3 per cent. is a sufficient number in order to weed out those who have succeeded in entering college, but are entirely unable to do the work which they have chosen. I can not regard it as just to grade the other 22 per cent. as failures. But I do not mean by this that they ought to be permitted to take advanced work in the same line of study or to enter courses of other departments for which this particular study is required, or that they should receive credit for the whole number of hours. The teacher who gives these advanced courses and the teacher who gives the course of the other department must have the power to admit or to exclude these 22 per cent. students as he deems best. And the faculty should decide what fraction of the regular number of hours of credit they should receive. Similarly, the faculty should, as Professor Cattell has proposed, give more than the usual number of hours of credit to those students who have excelled the medium 50 per cent. To make all this possible the teacher must place each student in the group to which he belongs according to his rank. But those whose rank puts them in the fourth group should not be called failures in every possible sense, should not be regarded as having accomplished nothing. If a teacher instructs his class in such a manner that according to his own judgment 25 per cent. of them accomplish nothing, then the conclusion is justifiable that the teacher as a teacher has not accomplished anything, either.

The University of Missouri, as mentioned above, has two grades, D and E, both of which mean failure, but with this difference, that students who may be permitted to make up their deficiency by private work are graded D, whereas those who can receive subsequent credit for the course only by taking it over in class are graded E. To the present writer

it remains incomprehensible why this decision of the method of making up a deficiency, which can be made only by the individual teacher in the individual case, should determine a difference of grade. The grade to be recorded on the books of the institution should signify the student's rank and nothing else.

We now have before us this entirely practical question: If an institution adopts a system of grading like the one proposed, in which 3 per cent. are called excellent, 22 per cent. superior, 50 per cent. medium, 22 per cent. inferior and 3 per cent. failure, how can the individual teacher, who is perhaps in charge of a class of only five or eight students, comply with the system? There is only one answer to this question: He must work out his method of grading for himself on the basis of his individual experience with the students. But he should be given one kind of aid by the institution which he serves. The institution should publish annually a statistical table showing how each teacher has graded all his students the last year and the last five years, so that each teacher can inform himself easily as to whether he has graded his students in accordance with the system adopted by the institution or has unconsciously applied an arbitrary standard of his own and thus introduced confusion into the system. There can be little doubt that this would soon result in a great uniformity of grading, and inequalities of the size described would be impossible, to the satisfaction of both faculty and students.

One problem is still left. How should the ability of the five groups of students be represented in order to compute the claims of various students for honors which are to be given to those having the highest rank of a whole student body. The University of Missouri prescribes for this purpose that the first grade be represented by 95, the second by 85, the third by 75 and the fourth by 65. These values are so arbitrarily chosen that any one can see that no scientific influence has been effective grading on the probability curve, as we have tried to do, we are able to give a reasonable answer to the present question. In Fig. 2 the ability of the average medium student is found at the point where the abscissa is 0. The ability of the average superior student is found near $+1$, that of the inferior student near -1. The ability of the average excellent student is found near $+2$, that of the average failure student near -2. All these differences of ability are represented by steps which are about equal. To avoid negative values, it would, therefore, be the simplest method to represent the different grades agreed on by the numerical values 5, 4, 3, 2 and 1, and to multiply these values by the number of hours of work for which each grade has been received. The students whose totals are highest—making allowance for the probable error, which is about .04, if the total number of grades recorded during the college course is about 40—have then the best claims for the honor as far as scholarship is concerned.

Max Meyer
University of Missouri

A NEW COLOR VARIETY OF THE GUINEA-PIG[1]

Experimental studies made in recent years show that color inheritance in mammals is a matter of considerable complexity, but not beyond the possibility of analysis. The more carefully the matter is studied, the clearer does the fact become that color inheritance, in all its phases, conforms with Mendel's law of heredity. The seemingly complicated results are due to multiplicity of factors concerned in the production of those results. If we confine our attention to one factor at a time, we find that its behavior is strictly and simply Mendelian. Each factor is either present or absent and in general the presence of a factor is dominant over its absence. It is only when two or more independent factors are simultaneously concerned that complications arise. Thus two simple factors acting simultaneously may produce a result different from that of either factor by itself.

In the issues of Science for January 25, 1907, and for August 30, 1907, I have advocated the view (first advanced concerning mice

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