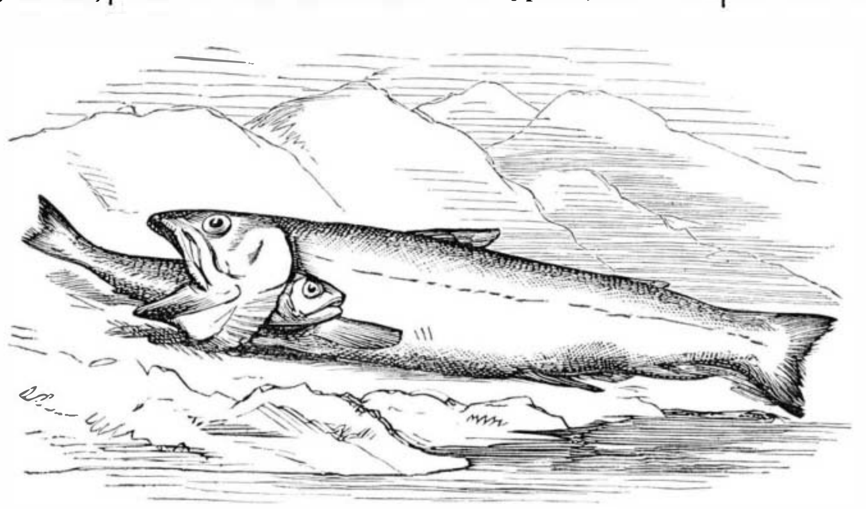
SINGULAR ACCIDENT TO A TROUT.

The trout shown in the accompanying engraving was recently captured in England, having come to an untimely death. Mr. Frank Buckland, the indefatigable naturalist who edits *Land and Water*, states that the trout was found lying dead, on its back, with a dace fixed tight in its gills, and further says:

"The only interpretation that I can give of this accident is that the trout had rushed at the dace to eat him, and, seizing him by the head, had attempted to swallow him; the dace, objecting to this process, and possibly knowing by instinct that if he got into the trout's stomach he would never return therefrom alive, fought hard for his life; and seeing a possible way of escape through the aperture of the gills, he used his best efforts to pass through: fate, however, was against him, and the unfortunate dace became wedged among the gills of the trout, and both fish thus perished.

"When we consider the delicate structure of the swallowing apparatus in all animals, ourselves included, it is really wonderful that more accidents by choking do not take place. In our own persons the apparatus for preventing accidents of this kind are, indeed, most marvellous. The trachea or windpipe is situated immediately in front of the œsophagus, and every morsel of food and fluid we swallow has to pass over the opening of the trachea, which is in fact not unlike the slit of a money box, before it can get into the œsophagus or gullet. The pain and irritation caused by even a crumb or a drop of water getting by accident into the trachea is very great. We cannot, therefore, sufficiently admire the wonderful valve which the Creator has placed upon the top of the trachea. The valve is self-acting, and luckily for us does not depend upon any volition of our own. If it were not so, a person's whole time might be taken up in watching every morsel of food he put into his mouth. By a beneficent arrangement, the act of swallowing is quite as independent of the volition of ourselves as is the action of the heart, the power of thought, and the machinery of the human system in general. The same state of things that is found in the structure of the inhabitants of the land prevails also in the structure of the creatures which live in the water, and among them, as among land animals, an accident is very rare; the above drawing is therefore the more interesting, inasmuch as it shows that even fish are sometimes choked by the living prey on which they subsist."



A TROUT CHOKED BY A DACE.

Correspondence.

The Tripartition of an Angle.

To the Editor of the Scientific American:

Dividing an angle in two parts is one of the easiest operations in geometry; but the division of an angle into three equal parts is considered a difficult and an impossible one.

Let it be supposed that the angle, A B C, is divided into three equal parts by the lines, B D and B E; then draw the arc, A C, and its chord; next draw the lines, A D, A E, D E, D C, E C, resulting in two isosceles triangles, A E D and D C E. Studying the properties of these triangles, we find that their altitudes are the division lines. These lines, therefore, must divide the base lines in two halves, and stand rectangular upon them. Therefore, if A D is really equal to D E, then A F must = F E, and D F be perpendicular to A E; and if D E = E C, then D G = G C, and G E is perpendicular to D C.

The following is the construction and solution of the problem: The angle, A B C, is to be divided into three equal parts: 1. Draw the arc, A C, with any radius. 2. Draw the chord, A C. 3. Divide the angle, A B C, in two parts by he line, B H. 4, 5. Draw the lines A H and H C. 6, 7. Draw semicircles, A F B and B G C, over each side of the given angle. These semicircles have the property of dividing all lines (chords) drawn from A or C to the periphery, A H C, into two equal parts, because each of their radii is half that of A B C. 8. Draw B I perpendicular to H C in its middle, and B M perpendicular to A H. 9. Make L I = B K. 10. Draw, with radius H I, the arc, H G C. 11. Draw B E through the point, G, where the arc, H G C, intersects the semicircle, B G C, and the same on the other side of B H, where B D is drawn through the intersecting point, F.

If the arc, A H C, is divided into a convenient number of equal parts, 8, 16, or so, of which M and K are two, draw M C, and K N perpendicular to M C; then N is the nadir of the altitude of the triangle, M C K. In the same way more points are found, all lying in the circle, H G C, with the radius, H I = B K + L K.

Both conditions are really complied with; C G = G D and E G is perpendicular to D C; the triangle, D C E, is isosceles, and D E = E C; and further, A D = D E. Therefore we have A D = D E = E C, and angle A B D = D B E = E B C.

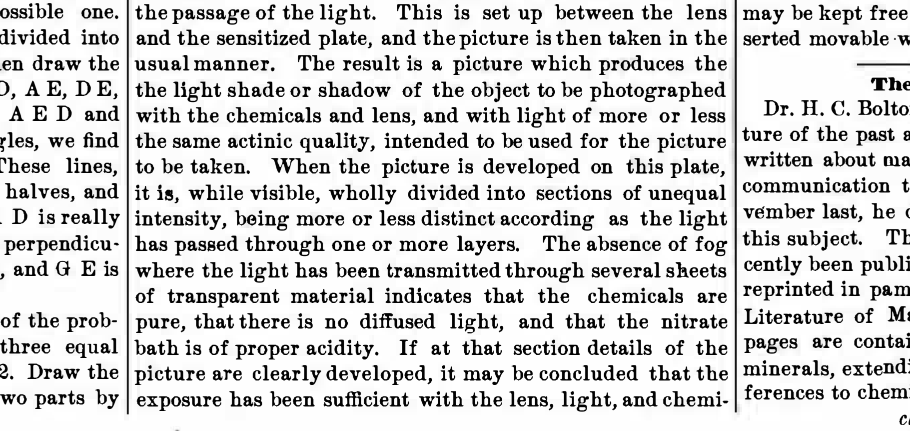
It remains to show that triangle D C E is the only isosceles triangle that answers both of these conditions.

M K C cannot be an isosceles triangle, because we made C K = H K = H M = A D, and therefore C K is not equal to K M. In every triangle in consideration, one side must be parallel with the chord of the given angle, as M K, A C, D E. Only one isosceles triangle fulfils this and the other conditions, and this is the one sought for.

In a similar way I tried to find the law for dividing an angle into n equal parts, when n is a prime number; but I am obliged to confess that I did not succeed. Nevertheless there is some law in these divisions. I found that the semicircle, A F B, is intersected in $\frac{n-1}{2}$ points by as many circles, the positions of which I cannot find, and there are as many parallel lines connecting the points of division. So 3 parts has 1, 5 parts 2, 7 parts 3, 11 parts 5, 31 parts 15. If n is an even number, for instance 6, then the problem is to be reduced to tripartitions, which must be made in each half. The semicircle is intersected in 2½ points, that means that one of the dividing radii goes through the points where the two semicircles cut each other, thus dividing the angle in two parts.

W. THIESE.

Rochester, N. Y.



A New Photographic Test Plate.

Mr. William A. Brice, of London, England, the inventor of the improved portable photographic apparatus illustrated in these columns not long ago, has patented through the Scientific American Patent Agency, September 12, 1876, a novel testing plate, which will enable photographers to determine with considerable certainty the quality of the chemicals employed, the quick or slow working of the lens, and to define whether the presence of "fog" or want of clearness in the picture is attributable to impurities of the chemicals, alkalinity of the bath, diffused light, over-exposure to light, or to other causes.

The invention consists of a frame with a sliding glass plate, to which are applied fixed pieces of transparent material superposed in layers of one, two, three, and more, in regular succession, to produce a greater or less obstacle to the passage of the light. This is set up between the lens and the sensitized plate, and the picture is then taken in the usual manner. The result is a picture which produces the the light shade or shadow of the object to be photographed with the chemicals and lens, and with light of more or less the same actinic quality, intended to be used for the picture to be taken. When the picture is developed on this plate, it is, while visible, wholly divided into sections of unequal intensity, being more or less distinct according as the light has passed through one or more layers. The absence of fog where the light has been transmitted through several sheets of transparent material indicates that the chemicals are pure, that there is no diffused light, and that the nitrate bath is of proper acidity. If at that section details of the picture are clearly developed, it may be concluded that the exposure has been sufficient with the lens, light, and chemicals used. The second section of the testing plate, where the light passes through a less number of layers, gives more or less the same information, but indicates more clearly whether the exposure has been adapted to existing conditions or not. The next section indicates, if properly developed, what time, chemicals, etc., are to be used for the picture to be taken; while the middle or uncovered section indicates by the evident over-exposure that the lens is good and rapid in action, that the chemicals are in good condition, and that the light is sufficient in actinic power to produce good pictures with rapid exposure. The device is one which photographers will doubtless find labor-saving and of much general assistance.

The Preparation of Salicylic Acid.

Cahours obtained salicylic acid in 1844, from methyl-salicylate, or oil of wintergreen (*gaultheria procumbens*). Professors Kolbe and Lautermann in 1860 brought out their method of obtaining the acid from carbolic acid; but it was not until within the last year that Kolbe discovered its peculiar preserving and disinfecting properties. The manner of obtaining the acid from carbolic acid is as follows: The saturating capacity of a carbolic and also that of a soda lye is determined, and both are then mixed according to equivalents, so as to form sodic carbolate. The solution thus obtained is carefully evaporated to dryness, taking care that the dry mass sticking to the bottom of the vessel is constantly removed by scrapers, and that the mass itself is also constantly crushed, with a pestle or other tool, to facilitate its drying out, until at length the carbolate remains as a perfectly dry powder of a rose-red tint. Excess of carbolic acid gives always an inferior dark-looking residue, which, when it undergoes the final process of treatment with carbonic acid gas, gives far less salicylic acid than is in accordance with the amount of carbolate calculated in the mass. The dry carbolate is then either put into the retorts at once, or it may be kept for further treatment by putting it, while hot, into vessels which may be hermetically sealed. The fact that sodic carbolate is very hygroscopic explains the necessity of this manipulation.

After the carbolate is put into the retorts, the contents are slowly heated to 212° Fah., and when this temperature is reached, a slow current of perfectly dry carbonic acid gas is allowed to enter the retort. The temperature is then slowly increased to 356° Fah., and may, towards the end of the operation, reach to 428° or 482° Fah. About an hour after the beginning of the operation, carbolic acid will begin to distil, and the process may be considered finished, if, at the latter mentioned temperature, no more carbolic acid distils. It will be found that the distilled carbolic acid amounts to just one half of the original quantity employed. The residue in the retort is basic salicylate of soda, which is dissolved, and which, on acidifying with an acid, yields a brownish-colored crystalline precipitate of salicylic acid.

With regard to the purifying of the crude acid as obtained by the process given above, Rautert's method is usually employed; it is as follows: The crude acid is placed in a retort and strongly heated to 338° Fah., when a current of steam at a like temperature is injected into the retort. In the presence of the superheated steam, the acid distils at once; and after a short time, nothing remains in the retort but a trace of a black resinous mass. The apparatus must be arranged in such a manner that the neck of the retort may be kept free from crystals, as, for instance, by an inserted movable wire.

The Literature of Manganese.

Dr. H. C. Bolton of this city has been ransacking the literature of the past and present to learn what has been said and written about manganese, its ores and its compounds. In a communication to the Lyceum of Natural History, in November last, he detailed all the sources of information on this subject. The results of his patient labors have recently been published in the *Annals* of that society, and also reprinted in pamphlet form under the title of "Index to the Literature of Manganese." In this little pamphlet of 44 pages are contained 400 distinct references to manganese minerals, extending from 1596 down to 1873, and 1,700 references to chemical papers beginning with Pott's "*Examen chymicum magnesiæ vitriariorum, Germanis Braunstein*," published in Berlin, in 1740. The value of an index of this kind, to a person wishing to examine the literature of or study any of the compounds of manganese, can scarcely be over-estimated. The references are arranged in chronological order, and give the name of the investigator, subject of the paper, and list of all the journals into which it has been copied with number of volume and page.

Nor is this the first work of the sort done by this chemical antiquarian. In 1870, Dr. Bolton published a similar index to the literature of uranium, from its discovery by Klaproth in 1789 to 1869.

We hope that other chemists, who have prepared extensive lists of reference on subjects that they were investigating, will be induced to put them in print for the benefit of others that may come after, in a style uniform with those above described.

Electrical Dust Figures in Space.

A brass rod pointed at one end, and with a ball at the other, is laid horizontally on an ebonite plate supported on wood; receives sparks from an electric machine; is discharged by touching, and removed; and the plate is then sprinkled with a fine powder. The author gives drawings of the negative and positive figures obtained. Conceive these turned about their axes, and we have the electrical dust figures in space, of which the ordinary Lichtenberg figures are merely sections.