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THE TWELFTH TENNESSEE SCIENCE TALENT SEARCH — 1958

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The Talent Search Committee[1] of the Tennessee Academy of Science reports twenty-five names of high school seniors, Class of '58 for honors in the twelfth annual competition. Each of these talented students has received a Certificate of Award, and has been recommended to some forty colleges and universities of Tennessee and other States as worthy of consideration for scholarships.

In December of 1957 approximately 100 seniors, sponsored by 74 science teachers in 72 high schools of Tennessee, submitted their records and a report of an original science project to the Westinghouse Science Talent Search, administered by Science Clubs of America, Science Service, Washington, D. C. Four Tennesseeans received Honorable Mention when the results were announced in March; they are: Arthur William Bushore and Harold P. Erickson of Bristol, Charles Edward Johnson of Knoxville, and Vincent de Paul Mallette of Chattanooga.

The Tennessee Committee received from Washington all of the records and reports of the Tennessee competitors. These were evaluated (chiefly by Dr. Buehler) and twenty-five were selected for awards. This number is comparable to the awards in previous Searches: in 1957 thirty-two names were selected; in 1956, twenty-eight names, etc. In only two years have honors been given to more than thirty seniors; in only two years has the number been less than twenty names. The awards are to a truly select group of high school seniors.

The present occupations of those mentioned in previous Honors Lists have been compiled, and presents an impressive record as to real talent uncovered by the Tennessee Science Talent Search. Practically all of the seniors entered college the next fall, a majority on scholarships. Many who were named in the Sixth (1952) and previous Searches have graduated with

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[1] The Committee on the Annual Science Talent Search is appointed by the President of the Tennessee Academy of Science. Its members for 1958 are: Dr. Calvin Buehler, Head, Department of Chemistry, University of Tennessee, Knoxville; Mr. James F. Key, Instructor in Physics and Science Education, George Peabody College for Teachers, Nashville; Mr. James L. Major, **Chairman**, Chemistry and Physics, Clarksville High School; Miss Katherine Matthews, Head, Department of Biology, West End High School, Nashville; Dr. Hanor A. Webb, Emeritus Professor of Chemistry and Science Education, George Peabody College for Teachers, Nashville; Dr. J. H. Wood, Department of Chemistry, University of Tennessee, Knoxville.

science majors from the colleges they chose to attend. Many are now employed in industries based on science, in Companies of high standing throughout the United States. Some have entered the Armed Forces, and are on technical duty. The girls in most cases are experts in scientific home management — an occupation wholly approved. For what the information may imply, no one of these talented persons is reported as teaching in a high school.[2]

The active sponsorship of the Tennessee Academy in respect to the annual Tennessee Science Search is contributing to the Nation's future scientific personnel. It is appreciated by high school seniors, their science teachers, and the parents of talented youth throughout the State.

The Honors List

In the following list these items appear, in sequence: (a) the student's name and age, (b) the science project, (c) the teacher's name, (d) the school.

Alcoa: 1. (a) Hans P. Schroden, 17, (b) Vapor Pressure in Trinary Solutions, (c) Miss Dorothy Cox, (d) Alcoa High.

Bristol: 1. (a) Arthur William Bushore, 17, (b) Building Plasma Jets. (c) Frank H. Maples, (d) Bristol High. 2. (a) Albert W. Cowan, 18, (b) Absorption of Radioactive Calcium by Fish, (c) Frank H. Maples, (d) Bristol High.

Chattanooga: 1. (a) James A. Bryan, 17, (b) Ram Jet Engines at Low Speed, (c) Paul D. Greer, (d) McCallie School. 2. (a) Harold P. Erickson, 17, (b) An Electronic Musical Instrument, (c) Sister Hyacinth, (d) Notre Dame High. 3. (a) Vincent de Paul Mallette, 18, (b) Electrical Combination Lock, (c) Paul D. Greer, (d) McCallie School. 3. (a) Sarah W. Salter, 16, (b) Chloramine's Characteristics, (c) Conrad Bates, (d) Chattanooga High.

Clarksville: 1. (a) Jimmy S. Davis, 17, (b) Solar Distillation, (c) Joe Minor, (d) Clarksville High. 2. (a) Thomas B. Markham, 16, (b) Model of Nuclear Power Plant, (c) Joe P. Minor, (d) Clarksville High.

Knoxville: 1. (a) Fred R. Clayton, Jr., 17, (b) Concentration and Solubility, (c) Miss Lula Shipe, (d) Central High. 2. (a) Charles Edward Johnson, 17, (b) Purification of an Organic Compound, (c) Miss Lula Shipe, (d) Central High, 3, (a) Donald A. Martin, 16, (b) The Nature of Dimensions, (c) John Johnson, (d) Young High. 4. (a) John T. Murphy, 17, (b) Detection of Neutrons in a Cloud Chamber, (c) C. A. Browning, (d) East High.

Memphis: 1. (a) Richard A. Barfield, 17, (b) Mars in Opposition, 1900-1957, (c) J. D. Reding, (d) Treadwell High. 2, (a) Richard G. Brown, 17, (b) Silicon Solar Battery, (c) J. D. Reding, (d) Treadwell High. 3. (a) Don Howard Nicholson, 17, (b) Fetal Circulation, (c) Miss Dorothy L. Green, (d) Central High. 4. (a) Leslie H. Palmer, 16, (b) Quantum Mechanics, (c) J. D. Reding, (d) Treadwell High.

Nashville: 1. (a) Jerry C. Collins, 16, (b) Behavior of White Rats, (c) John Netterville, (d) David Lipscomb High. 2. (a) Sue Edney, 17, (b) Wild Flowers in Tennessee, (c) Kenneth Stier, (d) Cumberland High. 4. (a) Randolph P. Pickel, Jr., 17, (b) Liquid Fuel Rocket Engine, (c) Solon Apple, (d) Hillsboro High.

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[2]Information as to the college, employment, service, etc. of finalists in the Tennessee Science Searches First (1946) to Eleventh (1957) to the extent the information is available, is published in **Journal of the Tennessee Academy of Science**, XXXIII, 140-147 (April, 1958).

Niota: 1. (a) Robert Louis Thomas, 16, (b) Moisture Expansivity of Paper, (c) Jere Warner, (d) McMinn County High.

Oak Ridge: 1. (a) Marcus T. Cohen, (17), (b) Radiation Protection, (c) Dill B. Asher, (d) Oak Ridge High. 2. (a) Adrian Russell Lawler, Jr., 17, (b) Household Insect Pests, (c) Dill B. Asher, (d) Oak Ridge High.

Pulaski: 1. (a) Raymond E. Patterson, 17, (b) Basic Magnetic Energy, (c) Mrs. J. M. Rackley, (d) Giles County High.

Whitehaven: 1. (a) J. Harvey Bailey, 17, (b) Infrared Radiation in Commerce, (c) Joe Summers, (d) Whitehaven High.

SCIENCE TALENT AT WORK

Report condensed by Hanor A. Webb

What do they do?—these talented high school graduates of June, identified by the annual Tennessee Science Talent Search sponsored by the Tennessee Academy of Science? With hardly any exceptions, in the fall they attend the college or university of their choice, usually on a scholarship.

Where do they go? The first two hundred of these winners of honors in the Searches entered fifty different institutions of higher learning.

What do they study? Except for a very few, they study science — straight, or applied.

How do we know? Mr. James L. Major of Clarksville High School, Chairman of the Academy's Science Talent Search Committee, and Mrs. James L. Key, a Committee member, have compiled at considerable labor — information as to the present locations and activities of winners from the First Search to the Eleventh (1957). Although not wholly complete (what census is?) the files prove that these young people *do* go to college, and that they *do* follow scientific occupations after graduation.

A full report would make a lengthy document. Here, however, are some condensed figures of significance:

Fifty colleges and universities were fortunate (as we see it) to be selected by the first two hundred students whose choice is known. The University of Tennessee (all branches) led the list, with 58 students of the group. Vanderbilt University was almost equally approved, having 42 of the Talent Search winners in its student rolls. Other institutions had from one to several winners attending. All are named in concise titles:

Alabama Polytechnic, Austin Peay, Belmont, Carson-Newman, Chattanooga, Chicago, Christian Brothers, Colorado School of Mines, Cornell, Davidson, DePauw, East Tennessee State, Georgia Tech, Harvard, Idaho, Illinois, Incarnate Word, Kings, Louisiana, Mary Knoll, Massachusetts Institute, Memphis State, Michigan, Mississippi, Notre Dame, Oberlin College, Oklahoma, Peabody, Pennsylvania, Princeton, Purdue, Rice, Rochester, Saint Ambrose, Saint Louis, Sewanee, Sorbonne, Southern Missionary, Southwestern, Tennessee, Tennessee Polytech, Texas, Tulane, Tusculum, U. S. Naval Academy, Vanderbilt, William and Mary, Wisconsin, Yale.

What major scientific interests have these talented young people followed? Information from the earlier searches is used; it takes time to achieve. Many of the young ladies are now talented housewives and mothers. Any objections?

Two male winners in the earlier searches have earned the Ph.D degree; the subjects, chemical engineering and physics. Two are Doctors of Medicine, and one a Doctor of Dentistry, all three being in military service. The Master's degree has bee nearned by many, and the Bachelor's degree by all who have had time to finish it.

A gratifying number of these Bachelors are continuing in graduate study. Others are in college positions in biology, forestry, mechanical engineering, as instructors. Many more of them are in industrial employment in such fields as architecture, chemistry – control and research; engineering of all kinds – aeronautical, chemical, civil, electrical, electronic, mechanical, sales; geology, zoology. Several are in testing laboratories of large firms; some are employed by the Atomic Energy Commission.

Practically all reports of Searches after 1953 list "student" as the present activity. These are majoring in all fields of engineering, also pre-medical, mathematics, biology, chemistry, physics. Two have turned to literature as a specialty; one intends to make his fortune in business administration, one plans to serve God and mankind as a priest.

Chairman Major plans to bring all present files to as nearly complete a record as is possible, and to keep future files current and continuing.

COLOR'S EFFECT ON TEENAGERS' PREFERENCES OF FRUIT JUICES[1]

CAROLYN SHAFER
Central High School, Knoxville

Can color really influence the smell, taste, and texture of fruit juice? That was the question I wanted to answer when I began my project. The first step was to outline how to carry out the testing. I conferred with Mr. H. H. Kroll, my biology teacher, and Dr. James Porter and Dr. Ernest Furchtgott, of the U. T. Psychology Department. I discussed the problems of testing, and they were very helpful. I chose a fruit juice for my survey because it was easy to prepare, color, and relatively easy to transport to school where I did most of my testing.

[1]The project described in this paper was one of the prize-winning projects exhibited at the meetings of the Junior Academy of Science in Murfreesboro, November, 1956.

I worked out a questionnaire which would not consume too much time per person and which, I felt, would answer the question, "Can color influence the smell, taste, and texture of fruit juice?" The students were tested individually, and my questioning was identical:

"Please sit down. What is your age? Now would you please smell each one and tell me which one smells the worst, which one smells the best, or no preference? Now would you taste them and tell me which one tastes the sweetest; which one tastes sourest, or no preference? Which one is the thickest, the thinnest, or no preference? Now which color do you like best, which color do you like least, or no preference? That's all. Thank you."

As they sampled, I checked their answers and marked the sex, date, and group.

The organge juice they drank was a standard-brand frozen concentrate mixed in normal proportions. The juice to be used on the following day was first mixed in large quantities, divided into four jars, and food coloring added:

Sample "G" – natural color orange juice.
Sample "N" – 1 drop of red coloring to 2-1/2 cups of juice.
Sample "R" – 2 drops of red coloring to 2 cups of juice.
Sample "W" – 6 drops of red coloring to 2 cups of juice.

Each of the 100 students was tested with one ounce of each sample.

When I completed all the testing, I tabulated the results and recorded these figures in graph form. The most interesting are on the charts I brought with me today:–

This summary shows that 69% of the students had a preference when the only variation was a tasteless and odorless food coloring. Whereas, 31% had no preference.

Now here are some other interesting results:–

Color Preference

This chart shows which color of the four was liked best by the students. As you can see, the two extremes, "G" the lightest and "W" the darkest, were preferred. "N" and "R", which were the intermeditors, were not liked as well. 33% preferred the natural orange juice and 35% preferred the reddish orange juice. The reason the "No Preference" column is so small, is that nearly everyone has a definite opinion as to which color he likes best!

Smells Worst

The students could not so easily tell which one smelled the worst, therefore the "No Preference" column is very high; still the two extremes, "G" and "W" were preferred. However, the sum total of the 4-sample columns is 8% higher than the "No Preference" column, showing that color did influence them.

Thickest

This chart indicates a fact that is generally well known: The darkest color is thought to be the thickest even when it actually is not! Here the "W" column is considerably higher than even the total of the other three columns. The percentages are:

"G"–7% "N"–11% "R"–11% "W"–45% No Preference only 26%

It is interesting to note that the extremes of opinion in this one test were greater than in any other test.

Thinnest

Also on this chart a generally assumed idea is verified: "G", the lightest in color, is believed to be the thinnest. This backs up the previous chart, although the numbers were not exactly reversed, the percentages being:

"G"–39% "N"–10% "R"–13% "W"–8% No Preference–30%

So you see, the lightest, "G", is believed to be the thinnest and the darkest sample, "W" is considered the thickest.

Sweetest

Rather surprisingly, on this chart, too, the extremes, "G" and "W" were preferred:

"G"–22% "N"–7% "R"–16% "W"–23% No Preference–32%

Although when the students were asked which sample was *sourest,* percentages were for some reason very similar:

"G"–16% "N"–18% "R"–16% "W"–11% No Preference–39%

It seems that the students could easily choose which one they believed to be the sweetest, but could not so readily choose the one they believed sourest. Even though the "No Preferences" on both sweetness and sourness were extremely high, considering the fact that there was no actual difference in taste, it is noteworthy that the total opinion percentage for both charts is at least 22% higher than the "No Preference" percents.

Sex Differences (See chart)

Do you think sex made any difference in the taste and smell of orange juice? Well, it did! You can see for yourself how *many* more boys than girls had a preference, because they were affected by the color of the orange juice – 71% of the boys versus only 48% of the girls! A very small 29% of the boys had no preference whereas 52% of the girls had no preference. Contrary to popular opinion, boys, *not* girls, seem to be more affected by color of fruit juice.

As a result of the testing, I have an answer to my question, "Can color really influence the smell, taste, and texture of fruit juice?" Since there was no variation in any of the fruit juices except the color, which had no smell, no taste, and no difference in texture, all these charts show that high school students *are affected* by the color of the fruit juice.

DERIVATION OF MODERN NUMBER SYSTEM[1]

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A keen interest in mathematics has led me to trace our modern number system to its origin. In my research, I found that we can trace our present system from prehistoric times through the Babylonian Cuneiform, Egyptian Hieroglyphics, Greek Herodianic, Roman, Hindu, Arabic, and Old European to Modern.

Let us examine the prehistoric numbers first. The simplest, and probably oldest, method of representing numbers is on our fingers. It is far older than either number names or number symbols. The wide use of 10 as the base of many of our number systems is due to the representation of the first ten numbers on the fingers.

Finger notation was used until the Middle Ages. During this time, many other systems came into being. The first one of any importance was the Babylonian Cuneiform. This system combined the bases 10 and 60, in that the symbol for 1 also represented 60, 60^2 and even 60^{-1}. The addition principal was used in this system. This was represented by putting the symbols to be added side by side. For example, 58 would be represented by the symbol for 10 written 5 times and the symbol for 1 written 8 times. Similarly, 142 would be written as 1 written twice (i.e. 2 x 60), 10 written twice (2 x 10), and 1 written twice. A sign for subtraction sometimes occurred, its use permitting the writer to write a number such as 139 (i.e. 2 x 60 + 2 x 10-1) The great disadvantage of the system was that you could not tell whether the lowest place in a number was a unit, a multiple of 60 or of 60^2, or even a multiple of 60^{-1}.

The next system of any importance to arise was the Egyptian Hieroglyphics. This system arose when Egypt came in as a world power. It was based on symbols for 1, 10, 100, 1,000, and 10,000. These symbols have come to stand for certain concrete objects: the 1 for a vertical staff; 10 for a sheaf of wheat; 100 for an ear; 1,000 for a lotus plant; 10,000 for a pointing finger. These symbols were repeated as often as necessary and the order of the symbols was immaterial. Numbers were commonly written from right to left, but they were sometimes written from left to right, and sometimes even vertically.

The next system was the Greek Herodianic. This system became important when Athens replaced Egypt as leader of the

[1]The project described in this paper was one of the prize-winning projects exhibited at the meetings of the Junior Academy of Science in Murfreesboro, November, 1956.

world. This system was used only in Athens, until she reached her supremacy; and then all the Greek city-states, and most of the world, adopted this system. In this system, the numbers were represented by the first letter of the name of the number. These symbols representd multiples of five.

When Rome ousted Athens as the world power of that time, she instituted her own number system. It was a great deal like that of the Greek, as the Romans borrowed much from the Greeks. Like the Herodianic, it had symbols for multiples of five as well as for powers of ten. The addition principal was used in writing all numbers but 4 and 9, and numbers ending in 4 or 9. The subtraction principal is employed here. Roman numerals are still used in many places, as on the faces of clocks and in the numbering of many books.

At this time, the Hindu system was flourishing in the East. They are not directly part of the chain, but they greatly influenced the Arabic in that they transmitted their system to Arabia. This system is also important in that it is one of the first traces of our present system of writing numbers. There was no zero, however, and one could not write a number such as 207, so it was no better than the others.

The Arabs who received the Hindu system changed it to suit thei rown needs. The Arabic system is generally regarded as the predecessor of our modern system. In this system for the first time a zero appeared. It was only a small dot, but has since been enlarged to look more like a circle.

The Arabic system was spread into Europe when the Arabs tried to spread Mohammedism in Europe. The Europeans formed their own system during the Middle Ages. This system has the same general characteristics as our present system. It showed the influence of the Roman as well as the Arabic influence. It was used until our modern system appeared.

Our last effort is much easier to work with than our first. Most people know how to work algebra problems with our modern system. But how many could work an algebra problem with our first system, using our fingers?

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