

Changes in Matter Under Great Heat

Higher Temperatures Give New Knowledge to Man

At the Zeiss works in Jena, Germany, Dr. Cohn has collected the rays of the sun in a mirror and focused them on some zirconium oxide, which melted at 5,432 degrees Fahrenheit. Encouraged by this success, Dr. Anderson of Mount Wilson Observatory is now constructing a gigantic solar furnace composed of nineteen burning-glasses, each two feet in diameter. With this system he hopes to attain a temperature of 10,000 degrees Fahrenheit.

Investigations of this type are necessary if we are ever to solve the problems presented by matter. We live in a world of low temperature. New worlds, one after another, are revealed as normal temperature by 100 degrees and even less. If water can be changed into steam by a rise of temperature to 212 degrees Fahrenheit, and iron becomes an incandescent liquid when it is melted at 1,500 degrees Centigrade (2,736 degrees Fahrenheit), what would happen at 10,000 degrees Fahrenheit?

As the temperature rises, matter becomes freer and freer. Atoms break from molecules, and at last, in the blazing sun and the stars on high, even electrons escape from atoms. In the glow of an electric lamp and the fierce blaze of the sun a final, great moment is reached: light is the apotheosis of motion.

By high temperature the physicist means anything over 500 degrees Centigrade (932 degrees Fahrenheit), at which the first faint glow of red appears in iron. "White heat" begins at 1,000 degrees Centigrade (1,832 degrees Fahrenheit). Some twenty-eight metals melt at about that temperature. Long before it is reached (at 800 degrees Centigrade or 1,472 degrees Fahrenheit) there is no more magnetism; some inexplicable change has taken place in the electrons of atoms.

Blow into coal fire with a blast that has the fury of a tempest. The effort is useless in driving the temperature still higher than that of molten iron. The chemist steps in and gives us inflammable gases which he combines with oxygen. So we have oxy-hydrogen and oxy-acetylene flames. With their aid the rebellious molecules of platinum melt at 3,200 degrees Fahrenheit. Only a little higher—484 degrees Fahrenheit more, to be exact—and all matter becomes a conductor of electricity.

At 5,432 degrees Fahrenheit tungsten melts—the metal of which the filaments in electric lamps are now made. We are still in the primitive stage of being constrained to burn or heat something to incandescence in order to create artificial light. The higher the glowing point the brighter the light. Hence, the years spent in research by Dr. Coolidge to discover a way to felt together the particles of brittle refractory tungsten, normally a powder, so that it can be drawn into a fine wire.

Electricity galvanizes the molecules of a metal into furious activity. Metallic arcs, used in welding, drive them to a frenzy indicated by 3,600, 3,800 degrees Centigrade (6,512-6,872 degrees Fahrenheit). Higher still is the temperature of the carbon arcs—3,900 degrees Centigrade or 7,000 degrees Fahrenheit. Steel is now melted by them, one hundred tons at a time, and the carbon rods are so huge that they are pushed forward by electric motors.

Molecules can be lashed into fury on radio principles. So we have the induction furnace invented by Dr. Edwin F. Northrup while he was a professor at Princeton. Not only is steel melted in this furnace but a much higher temperature has been made available. Graphite has been vaporized from a large chamber heated to 3,600 degrees Centigrade (6,512 degrees Fahrenheit). Ordinary rocks of silica or magnesia base are torn apart and changed into vapors. Bits of wood flash into gas before they apparently even enter the heating chamber. The gas thus generated by a quarter of an inch cube is almost enough to blow the furnace apart.

The highest temperature that man has thus far produced is 45,000 degrees Fahrenheit, obtained by passing 50,000 volts through a fine tungsten wire. A blinding flash, a report, a puff of air—that is all. No earthly measuring instruments could stand up under the heat. Even at 5,000 degrees Fahrenheit the methods of measurement are poor—the result of calculation rather than of exact comparison with accurate standards.

Eddington's estimate of 72,000,000 degrees Fahrenheit for the interior of the sun is highly imaginative and stands on a very shaky foundation.

RESOLUTION

Without the resolution in your hearts to do good work, so long as your right hands have motion in them; and to do it whether the issue be that you die or live, no life worthy the name will ever be possible to you, while, in once forming the resolution that your work is to be well done, life is really won, here and forever. And to make your children capable of such resolutions, is the beginning of all true education.



How to play Bridge AUCTION and CONTRACT

by Wynne Ferguson
Author of "PRACTICAL AUCTION BRIDGE"

ARTICLE No. 25

It isn't often that a problem can be analyzed as they all contain good points of play that come up frequently enough to make the analysis well worth while. Try it out before reading but the main ones have been selected the following solution:

Problem
Hearts—A, 10, 8, 2
Clubs—7, 4
Diamonds—none
Spades—Q

Hearts—K, 6, 5
Clubs—8
Diamonds—8, 4
Spades—8

Hearts—J, 3
Clubs—5, 2
Diamonds—5
Spades—J, 9

Hearts—Q, 9, 7
Clubs—6
Diamonds—10, 7, 5
Spades—10, 7, 5

Hearts are trumps and Z is in the lead. How can Y win four of the seven tricks against the best defense? The only correct play is for Z to lead the deuce of clubs, forcing A to win the trick with the eight of clubs. A can now make any one of three leads. (1) He may lead the eight of diamonds or (2) the eight of spades or (3) the five of hearts. The eight of diamonds is A's best lead. Y should trump with the ten of hearts and B should now trump with the Queen. B may now lead (a) the nine of hearts or (b) the five of spades or (c) the seven of hearts. If (a) is led, Z should cover with the jack, A with the king and Y with the ace. There are numerous variations but none present any difficulty for Y to make four tricks.

If, however, B leads the five of spades, Y wins the trick with the queen of spades and leads the deuce of hearts, allowing B to win the trick with the seven of hearts. B should now lead the ten of spades. Z plays the jack and A is forced either to discard or trump. If the former, Y also discards; if the latter, Y overtrumps, leads his trumps and wins the balance of the tricks. At trick three, B's best lead is the seven of hearts. Z and A should play low and Y wins the trick with the eight of hearts. Y should now lead the queen of spades and all follow the queen. Y should now lead the ace of trumps and follow with the seven of hearts, which A is forced to trump with the king of hearts. Y now wins the last trick with the deuce of hearts. The situation is as follows:

Hearts—A, 10, 8, 2
Clubs—none
Diamonds—none
Spades—none

Hearts—K, 6, 5
Clubs—none
Diamonds—4
Spades—none

Hearts—J, 3
Clubs—5
Diamonds—none
Spades—9

Hearts—Q, 9, 7
Clubs—none
Diamonds—none
Spades—7

It should be evident that A B must now win two heart tricks no matter how Y Z play. By doing so, Y Z only score three tricks so the lead of a diamond at trick one by Z is clearly incorrect.

Another suggested solution that should be noted is that to the lead of the five of diamonds by Z at trick one, A play the eight and Y trump with the ten of hearts. The defense of this play is for B to overtrump with the queen and then lead the nine of hearts. An analysis of this defense will show also that Y Z can win only three tricks, thus proving that the diamond lead at trick one is incorrect whether Y discards the queen of spades or trumps with the ten of hearts.

Bone Chewing Cows

Depletion of Mineral Reserves in the Body, One of the Factor in Milk Production Shrinkage

A cow producing an average of six quarts of milk a day for 40 weeks, will include in the milk produced 32 pounds of mineral substance. The source of the mineral substance in milk is in the mineral salts of the feed eaten. If the feeds supplied to the cow during the period of no pasture do not contain sufficient mineral matter to supply the demands of milk secretion, the cow is then at a loss to continue to secrete milk in a normal amount, unless she draws on the minerals that have been incorporated in her skeleton. Of course there is a limit to this, and trouble follows when the supply of minerals runs low. Three things may happen, a reduction in milk production, a weakening of the bones, a stiffness of the joints and a loss of condition. The animal tries to offset the drain on her body by eating unnatural things, such

Cross Baby

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Dr. Williams' BABY'S OWN TABLETS

foregoing represents the solution and variations when A leads the eight of diamonds at trick two.

Suppose A leads the eight of spades at trick two. Y wins this trick with the queen of spades and should now lead the seven, Z the jack and A should win with the king. B can now make only the queen of trumps. Suppose at trick two A leads the five of hearts. Y Z can now easily win all but one heart trick. Therefore, all three possible plays by A after Z leads a club give Y Z four tricks.

On the lead of the eight of diamonds by A at trick two, if Y trumps with the ten of trumps and B refuses to overtrump, Y should lead the queen of spades and then the deuce of trumps. If B plays the seven or nine of hearts, Z should play the jack and force A to win the trick with the king. In this way also Y Z win four of the seven tricks. These variations are all possible after Z makes the correct lead of the deuce of clubs and, if properly played by both sides, give Y Z four of the seven tricks.

No other lead is correct. Most of the solvers thought the five of diamonds was the correct lead allowing A to win the trick and on which Y should discard the queen of spades. This solution, however, is incorrect.

A should lead the eight of clubs and follow with the eight of spades. Z wins this trick with the jack of spades. The situation is as follows:

Hearts—A, 10, 8, 2
Clubs—none
Diamonds—none
Spades—none

Hearts—K, 6, 5
Clubs—none
Diamonds—4
Spades—none

Hearts—J, 3
Clubs—5
Diamonds—none
Spades—9

Hearts—Q, 9, 7
Clubs—none
Diamonds—none
Spades—7

Another solution was for Z to lead the nine of spades at trick one, forcing Y to win the trick. A lead by Y at trick two of either a trump or a club will do him no good and, with this opening, Y Z can make only three tricks. If A B make this proper defense, therefore, the only correct opening lead by Z that will enable him and his partner to win four tricks is the deuce of clubs.

This problem has been analyzed at such great length because every variation given is tricky and interesting. The writer would suggest that each of the variations be played out and tested from every angle. It is impossible to find a better problem than this one as a test of sound, careful play.

As bones and wood. The bone and wood chewing may supply in part what the cow needs and has a craving for, usually lime and phosphorus. If the habit of bone chewing has developed in your herd of cattle, during previous years, try and offset it this year by using steamed bone flour, or any mineral mixtures containing lime and phosphorus. Cows that are already in bad shape through mineral deficiency can be returned to normal condition by the use of a tonic containing phosphoric acid, in addition to the supplemental feeding of steamed bone meal.

An Avenue of Trees

Everywhere, as we approached Portsmouth, we saw quantities of timber lying near the road, ready to be conveyed to the King's magazines. This is both a picturesque and a proper decoration of the avenues to a dockyard.

About the tenth stone, we entered a corner of Bere-Forest, which afforded a beautiful scene. We rode through woods of oak which were sometimes close, and sometimes open. The road, which was everywhere ample, presented us in one place with an irregular vista; in another it carried us into a lawn interspersed with trees; or of patches of wood. The whole is so beautiful a piece of nature that if it were placed in an improved scene, it might be made, with very little art, to unite with the high style of decoration. From "Observations on the Coasts of Hampshire, Sussex and Kent," by W. Gilpin.

COURAGE

Take courage, for in good time, God will relieve thee of thy burden. He is mighty to help, and He will cause a blessing to spring from that which thou now deemest an inexhaustible source of sorrow. He will not leave thee nor forsake thee. Cling to Him, and He will hold thee up with His strong arm.—Zschokke.

Lost Ugly Fat

Her Husband says she Looks Five Years Younger!

There is a certain weight at which every woman looks her loveliest—not skinnily underweight nor pendulous overweight, but normal weight. We find artists, doctors, theatrical producers (and husbands!) all agreed upon this point. Read what this woman of 29 says about it.

"Having heard from a friend of mine that she had lost considerable weight since taking Kruschen Salts, I started using them in July last, when I weighed 177 lbs. I have lost weight steadily since then, and am now 159 lbs.—my normal weight. Moreover, I feel brighter and more energetic in every way. My age is 29. My husband is a very severe critic. He says I look five years younger. There is no other reason for my loss of weight except Kruschen, as I do not take any particular diet."—Mrs. S. R.

Taken every morning, Kruschen effects a perfectly natural and undigested food substances and all excessive watery waste matter. Unless this wastage is regularly expelled, Nature will eventually store it up out of the way in the form of ugly fat.

The Windmill

The green corn waving in the dale. The ripe grass waving on the hill: I lean across the paddock pale And gaze upon the giddy mill.

His hurrying sails a mighty sweep Cut thro' the air: with rushing sound Each strikes in fury down the steep. Rattles, and whirls in chase around.

Besides his sacks the miller stands On high within the open door. A book and pencil in his hands, His grist and meal he reckoneth o'er.

His tireless merry slave the wind Is busy with his work today. From whence'er he comes to grind; He hath a will and knows the way.

He gives the creaking sails a spin, The circling millstones faster flee; The shuddering timbers groan within, And down the shoot the meal runs free.

The miller giveth him no thanks, And doth not much his woe o'erlook; He stands beside the sacks, and ranks The figures in his dusty book.

—From "The Poetical Works of Robert Bridges."



He—"The woman I marry shall have everything money can buy." She—"I suppose that's why you are looking for a wife with money."

First Daffodil

I who have lain without a sound In my dark coffin underground, Now hear the stirring roots of trees, The brown earth rising to her knees, Unfettered now the springing sod— Up from the pulsing soil the clod Reaches to that forgotten blue— A soaring flight that I share, too— For I who lay in narrow earth Now know the miracle of birth. —Edith Lombard Squires in the Christian Century.

What New York Is Wearing

BY ANNEBELLE WORTHINGTON

Illustrated Dressmaking Lesson Furnished With Every Pattern



Importance of the jacket dress can't be over-estimated.

And here's quite a darling. The brief bolero may be made with short or long sleeves, just as you please about it. For warmer weather wear, you'll probably choose the former.

The dress made with dropped shoulders gives the effect of tiny cap sleeves. The skirt is widened through inverted plaits at either side.

It's adorably smart in cadet-blue checked wool crepe. The plain crepe tones with the checked crepe.

Printed crepe silk with plain crepe jacket is exceedingly wearable.

Style No. 2769 is designed for sizes 14, 16, 18, 20 years, 36, 38 and 40 inches bust.

For summer, it's sportive in white crinkle or flat crepe with the jacket low tie of marine blue crepe.

Size 16 requires 2 1/2 yards 39-inch material, with 1 yard 35-inch contrasting.

HOW TO ORDER PATTERNS.

Write your name and address plainly, giving number and size of such patterns as you want. Enclose 20c in stamps or coin (coin preferred); wrap it carefully for each number; and address your order to Wilson Pattern Service, 73 West Adelaide St., Toronto

Development of Land Aids Chinese Farmers

Nanking—More than 2500 farmers and laborers from the famine areas of Shantung Province, who are seeking new homes and work, have arrived at Chengchow on their way to Loyang, the new capital. The Chinese officials will send these people to the Northwest, where they will be given land to cultivate and to help in developing the territory.

Refugees from other sections of the country are being encouraged to go to the Northwest for the spring season.

Brushing the Enigma



An attendant brushes a mysterious wood carving that stands at Chatham, near London, England. The one-armed figurehead was taken from the old battleship, H.M.S. Rodney; but whom does it represent? Certainly not Admiral Rodney, after whose wife was named the present liner, Lady Rodney, of the Canadian National's West Indies fleet; for there is no resemblance with existing paintings of the admiral. British authorities say your guess is as good as theirs.—Photo Canadian National Railways.

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No man should make a bigger garden than his wife can hoe.
Summer time is here. So long as you have the old bus and ten gallons of gasoline, the world is before you.

Splinters
A man can never be a true gentleman in manner until he becomes a true gentleman at heart. Too many people think they are broadminded when they merely are too lazy to form an opinion. The safest way on earth to keep out of trouble is at once the simplest and the hardest. It's keeping one's mouth shut. Some girls expect a man to bring enough sunshine into their lives to give them a coat of tan. An amateur never knows how bad he is until he tries to turn professional.

Rheumatism
"You remember when you cured my rheumatism a couple of years ago," asked the patient, "and you told me that I should avoid dampness?"
"Yes, that's right," replied the doctor, approvingly.
"Well, I've come to ask you if I can take a bath."

Motor Boat for Sale
RICHARDSON DOUBLE CABIN R cruiser, about thirty feet, in use altogether only four or five months in two seasons; complete equipment, including carpets, bed and table linen, china, glassware and silver as well as all marine equipment and many extras. This cruiser with its two cabins and its well equipped galley is an unusually comfortable boat for week-ends or longer cruises for four or six people. It is exceptionally seaworthy and has cruised all over the Great Lakes. It has a 15hp class and very economical horsepower. Six-cylinder power plant with complete electric lighting throughout and speed of 12 to 14 miles per hour. It is a special paint job and very attractive in appearance. Owner will sacrifice for half its original cost. H. Watkins, 73 W. Adelaide St., Toronto.

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