PARAGRAPH NUMBER 9: The vertebrate integument consists of the skin and its derivatives. The exterior surface of the body is completely covered by the skin except in the areas of the nose, mouth, anus, and genital openings where it passes into a related tissue, the mucous membrane, which lines passage-ways. The skin may be divided morphologically into two layers — the epidermis, derived from the primitive ectoderm, and the corium which arises from the somatic mesoderm. The epidermis is composed of many layers of cells in two principal strata, the stratum corneum, and the stratum germinativum. The flattened cells next to the surface are hardened by deposits of paraleidin, a substance related to keratin, and are said to be keratinized. Below them are several layers of thicker cells whose active proliferation gives rise to the cells of the stratum corneum. These layers lie above the stratum germinativum, or malpighian or pigment layer. Granules of keratohyalin appear in the outer cells of this stratum as forerunners of the paraleidin, forming the thin stratum granulosum. A thin clear zone just outside of the granular layer, known as the stratum lucidum, is regarded as the basal layer of the stratum corneum. In its cells the granules of keratohyalin become a diffuse intermediate substance, eleidin. The exchange of food and waste between the malpighian layer and the blood is effected by osmosis and diffusion since no capillaries rise above the corium. The corium is a dense connective tissue layer extending from the fatty subcutaneous tissue. It is obscurely divided into an inner stratum reticulare and an outer stratum papillare which arises in papillae beneath the epidermis. The papillae are either nutritive or sensory. Epidermal derivatives including hair follicles, sweat glands, and sebaceous glands extend into the corium; and it contains nerve endings, tactile corpuscles and blood vessels.

QUESTIONS ON PARAGRAPH 9: ANSWERS

47. If the skin is pricked with a pin so that blood is drawn, we know that the pin has penetrated at least to the *1:* stratum corneum *2:* pigmented layer *3:* stratum germinativum *4:* stratum reticulare ☐1 ☐2 ☐3 ☐4 47

48. If we number the several layers of the integument beginning with the surface, the skin pigment is in layer number *1:* II *2:* III *3:* IV *4:* V ☐1 ☐2 ☐3 ☐4 48

49. The layer which originally gives rise to the keratinized material is the *1:* stratum reticulare *2:* stratum keratinosum *3:* stratum corneum *4:* stratum granulosum ☐1 ☐2 ☐3 ☐4 49

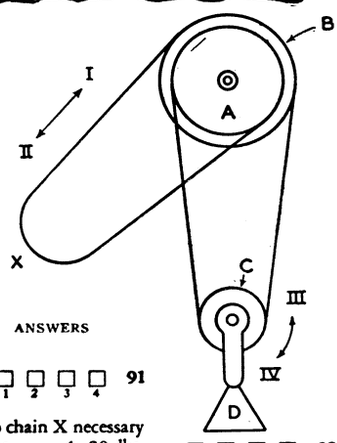
50. Non-mesodermal structures present in the corium are *1:* blood vessels *2:* sebaceous glands *3:* nutritive papillae *4:* eleidin ☐1 ☐2 ☐3 ☐4 50

51. The stratum granulosum *1:* lies above the stratum malpighii *2:* lies below the stratum reticulare *3:* is adjacent to the stratum corneum *4:* contains eleidin ☐1 ☐2 ☐3 ☐4 51

52. A structure found in the stratum germinativum is *1:* stratum corneum *2:* stratum papillare *3:* stratum reticulare *4:* stratum malpighii ☐1 ☐2 ☐3 ☐4 52

53. Mucous membrane is *1:* keratinized *2:* adjacent to the stratum corneum *3:* derived from the ectoderm *4:* derived from the mesoderm ☐1 ☐2 ☐3 ☐4 53

PARAGRAPH NUMBER 16: The diagram represents a pulley system. Pulleys A and B are fixed so that they can only rotate together. A has a circumference of 19 inches, and B has a circumference of 20 inches. Pulley C has a 10 inch circumference. The chain X is an endless chain.



QUESTIONS ON PARAGRAPH 16: ANSWERS

91. When chain X is pulled in direction I, the direction and rotation of movable pulley C will be *1:* up, II *2:* down, III *3:* up, IV *4:* down, IV ☐1 ☐2 ☐3 ☐4 91

92. If it requires 2 pounds pull to operate the hoist without weight D, the force applied to chain X necessary to lift a weight D of 80 pounds will be *1:* 3 lbs. *2:* 3½ lbs. *3:* 4 lbs. *4:* 20 lbs. ☐1 ☐2 ☐3 ☐4 92

93. In raising a load D through 2 inches, the number of revolutions made by pulley C will be *1:* $\frac{19}{200}$ *2:* 2 *3:* 8 *4:* 16 ☐1 ☐2 ☐3 ☐4 93

94. If the bottom of the chain loop around X and the pulleys is 100 inches from the center of the pulleys, its length when C has revolved twice and D has moved down will be *1:* 80.0 inches *2:* 99.5 inches *3:* 105.0 inches *4:* 120.0 inches ☐1 ☐2 ☐3 ☐4 94

95. The mechanical advantage of this chain hoist, disregarding friction, is *1:* 20:1 *2:* 19:1 *3:* 20:19 *4:* 40:1 ☐1 ☐2 ☐3 ☐4 95

Don't read further. Cover up this paragraph until you have taken the test. Here are the correct answers: 5, **3**; 6, **2**; 7, **3**; 8, **4**; 9, **2**; 10, **4**; 47, **4**; 48, **3**; 49, **4**; 50, **2**; 51, **1**; 52, **4**; 53, **2**; 91, **4**; 92, **3**; 93, **3**; 94, **2**; 95, **4**.

The following rating estimates how your score would compare with the brilliant group of high school seniors who completed the examination. The rating is based on your probable score for the entire examination computed from the portions which you have already taken.

If more than ten were scored right you did better than three-fourths of the scholars.

Those who got six to nine correct did well, falling in the middle 50%.

Five or less answered correctly, puts you in the lower fourth of those who completed the competition in the annual Science Talent Search.

Science News Letter, February 6, 1943

PSYCHIATRY

More Mental Health Units In Army Camps Urged

➤ MANY MEN could be saved for effective service in the armed forces and many mental breakdowns during training, costly to the man and the nation, could be prevented by the establishment of more mental health units in Army camps, Dr. George S. Stevenson, medical director of the National Committee for Mental Hygiene, declared.

Commending the efforts so far made in this direction, Dr. Stevenson spoke of Mrs. Eleanor Roosevelt's recent visit to the mental health unit at Ft. Monmouth, N. J., and her endorsement of its accomplishments. He said he heartily agreed with her "that such units should be installed in every classification center in the country."

Men who would be particularly susceptible to mental breakdown should be excluded before induction, so far as possible, Dr. Stevenson stated. In the haste of induction examinations, however, such men sometimes are passed, to the detriment and even potential danger of themselves and their units.

When danger signals show up after induction, a mental-health unit can provide means for their appraisal and treatment. Three-quarters of the men seen at such a unit are essentially normal, though giving evidence of minor maladjustments which might become serious if they remained untreated.

"Many danger signals come to the

attention of chaplains, company officers, instructors, military police, Red Cross and U.S.O. workers, and other special personnel," Dr. Stevenson said. "Heretofore, there has been little that could be done about the man who sits disconsolately in the U.S.O. hut, taking no advantage of its reading or recreational facilities; or about the man who in spite of exceptional intelligence cannot absorb the training; or the man who drowns his troubles in liquor, or goes A.W.O.L.

"These troubled individuals can now be given help in a mental health unit, if one exists in his camp, and it is significant to note that nearly one-quarter of all the men seen have sought such guidance spontaneously."

Science News Letter, February 6, 1943

RADIO

Radio Is at War

More than 500 factories and small shops are turning out equipment for the armed services. New specifications call for perfect performance.

➤ MORE THAN 500 factories and small shops, that used to make radio sets and equipment for civilian use, now have some 200,000 employes working day and night turning out communications equipment for the armed forces of America and her fighting allies, Rear Admiral Stanford C. Hooper, U.S.N., told the meeting of the Institute of Radio Engineers.

As a single dramatic example of what quick radio communication means in modern warfare, Admiral Hooper related an incident of the fighting during landing operations at Casablanca. The most formidable French warship putting up resistance was the battleship Jean Bart. An Allied battleship opened fire on her, at a range of 26 miles.

The first salvo scored a hit on her deck, a damaging but not a fatal blow. An observation plane flashed back a slight correction. The next salvo struck the ship at the waterline, immediately putting her out of action.

For military uses, radios must have qualities far beyond the very moderate requirements of peacetime sets, the Admiral reminded his hearers. He said:

"These new specifications reflect the demand for perfect performance; perfect reception by planes flying at twenty thousand feet, battling ice and sleet, as well as the enemy; perfect reception by pitching tanks, hurdling debris and jolting through shell holes in the heat of the African deserts; perfect reception for all our mobile equipment, whether it be in the Battle of Midway, the Aleutians, or the green hell of steaming jungles in the Solomons.

"These specifications call for equipment that must stand up with full efficiency under all conditions—tropical and Arctic temperatures, rapid changes in altitude, varying humidities, salt spray, hot sun and desert sands. It must be unaffected by the motion of motorized units, ships and aircraft, and the jar and vibration due to gunfire and shell impact. It must be fireproof, especially from the instantaneous hot flame which follows a bomb explosion or proximity to hot metal surfaces. It must carry on during severe icing and snow conditions. It must be rugged to withstand mishandling and operation by inexperienced personnel, and jars due to handling in transit. It must be designed to compromise ruggedness and extreme sensitivity.

"It must be capable of being operated adjacent to various other transmitters and receivers through the roar of battle, through electrical and other noises of ships and planes, and radio jamming. The radiation from tubes must not divulge presence to an enemy. It must be flexible in frequency shifting and power variation in order that shifts from one command or information channel to any other may be accomplished as required, and instantaneously.

"It must be constructed for installation in most limited spaces, with minimum weights, and convenient for operation. It must be instantaneously ready for operation at all times, exactly on the prescribed frequency, and accessible for adjustment and quick repair. Danger of accident due to electric shock to personnel must be prevented. These are but a few examples to show the need of specifications more elaborate than those governing design of commercial equipment."

Science News Letter, February 6, 1943

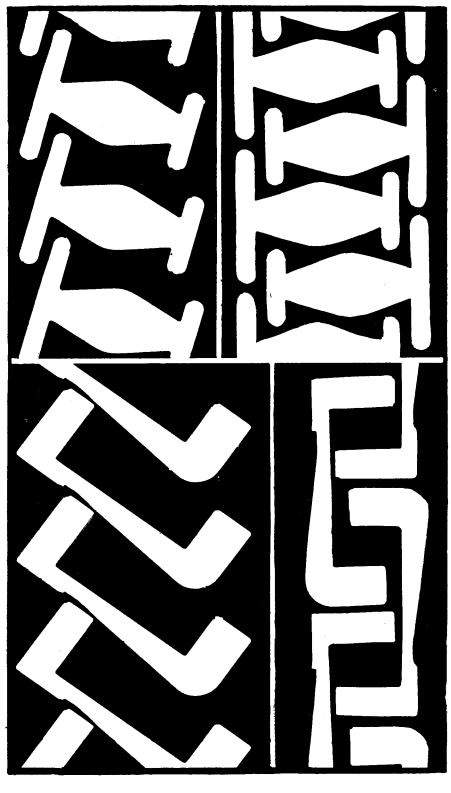
ASTRONOMY

Victory Ship Named for Designer of Telescopes

➤ A NOTED American astronomer, designer of the 100-inch telescope at the Mt. Wilson observatory and projector of the huge 200-inch reflector now being built for the new observatory on Mt. Palomar, was commemorated in the launching of the Victory ship George E. Hale, just off the ways of the California Shipbuilding Corporation. Dr. Hale's widow, Mrs. George E. Hale of Pasadena, was sponsor of the new vessel.

Dr. Hale died at Pasadena in 1938, at the age of 70 years. Besides planning the most massive instruments ever built for the exploration of the heavens, he carried on researches in solar physics and stellar evolution, and was the inventor of the spectroheliograph, which makes photographs of the sun in the light of a single selected element. He shares the latter honor with a French astronomer, Deslandres.

Science News Letter, February 6, 1943



SAVING—The layouts shown here show how precious metal is being saved in cutting pieces for war production. At the left is the way the patterns have been laid down when metal was more plentiful. At the right are economy layouts worked out by a General Electric Company expert.