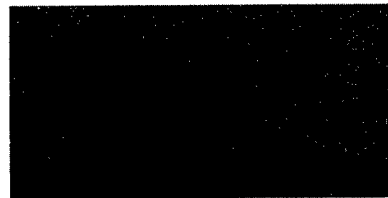


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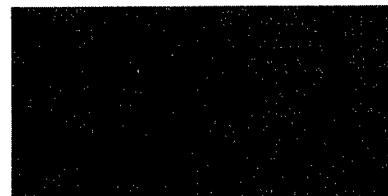


**CHINA**



PEOPLE'S REPUBLIC OF CHINA SCIENTIFIC ABSTRACTS

No. 194



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HIGH ENERGY PHYSICS

AUTHOR: None

ORG: None

TITLE: "Institute of High Energy Physics Holds Cosmic Ray Conference"

SOURCE: Peking KAO-NENG WU-LI [HIGH ENERGY PHYSICS] in Chinese No 3, Sep 77  
p 1, front cover, inside front cover

ABSTRACT: The first conference on cosmic rays of the Institute of High Energy Physics, CAS, was held on 1-4 June 1977. The participants stated that it will take China 15 years to catch up with the rest of the world in cosmic ray studies. The advantages of cosmic studies in high energy physics were emphasized: particles in accelerators can reach energies of only about  $4 \times 10^{11}$  electron volts, while in cosmic rays the energies may be on the order of  $10^{21}$  ev. The center of the Chinese research effort is the Yunnan Cosmic Ray Station, which in 1972 made a major contribution to research by discovering a possible heavy charged particle. It was set up in 1955 at an altitude of 3,180 meters in the Tung-ch'uan [2639 1557] region of Yunnan, equipped with 2 cloud chambers. An additional large cloud chamber at an altitude of 3,222 meters was added in 1958, and adjustments on this were completed in 1966. The equipment was automated in 1976. Recently an emulsion chamber was added, with an area of 5 square meters, making the station the best in the world. Emulsion photographs showing the results of a high energy nuclear process with an initial energy of about  $7 \times 10^{14}$

[continuation of KAO-NENG WU-LI No 3, Sept 77 p 1, front cover, inside front cover]

electron volts and an electromagnetic shower with an energy of  $2 \times 10^{13}$  electron volts are shown. A photograph of the facility is included. The conference received a message of congratulations from Chairman Hua and the party center.

AUTHOR: HUO An-hsiang [7202 1344 4382]

ORG: None

TITLE: "Some Questions Regarding Cosmic Ray Research"

SOURCE: Peking KAO-NENG WU-LI [HIGH ENERGY PHYSICS] in Chinese No 3, Sep 77  
pp 2-4

ABSTRACT: Cosmic rays consist primarily of high energy nuclei, electrons and gamma rays; hydrogen nuclei (protons) account for 93 percent, helium nuclei (alpha particles) for 6 percent, other nuclei, gamma rays and electrons for most of the remainder. Energies range up to  $10^{21}$  electron volts. The higher the energy the rarer the occurrence. The history of cosmic ray studies since their discovery in 1911 is reviewed; recent events of importance include the discovery of the lambda and sigma hyperons in 1950-51, the discovery of the Van Allen Belt by satellite in 1958, the discovery of an X-ray star using a rocket-borne detector in 1962, discovery of the X particle in 1971 and discovery of a gamma burst (by satellite) in 1973. The importance of technology in discovery, including the various kinds of detection chambers and exoatmospheric experiments, is described. The past influence of cosmic ray studies on physics includes Yukawa's prediction of the existence of the meson and the theory of strange particles. Although accelerators are now of primary importance in high energy physics, the contribution of cosmic ray studies should not be overlooked. Certain proposed

[continuation of KAO-NENG WU-LI No 3, Sep 77 pp 2-4]

high energy colliding-beam experiments are based on cosmic ray events observed in emulsion chambers: a nuclear process resulting in the production of more than 50 particles but no  $\pi^0$  mesons (energy above 10,000 Tev) and a shower involving  $10^5$  particles, with an energy of about 16,000 Tev. Other applications of cosmic ray studies include study of solar activity and monitoring of space objects such as X-ray stars.

AUTHOR: CHANG Chao-hsi [1728 5128 6007]

ORG: None

TITLE: "Heavy Leptons"

SOURCE: Peking KAO-NENG WU-LI [HIGH ENERGY PHYSICS] in Chinese No 3, Sep 1977  
pp 4-5

ABSTRACT: Three recent experiments have cast light on the question of the existence of heavy leptons. American and German experiments involving the collision of electrons and positrons produced a particle with a mass of 1.9 Gev and a charge equivalent to that of the electron, which decays into a mu meson (or electron) and 2 neutrinos. In another experiment the collision of neutrinos with nucleons resulted in the production of 2 or 3 mu mesons, which were apparently a product of decay of heavy leptons with lifetimes of about  $10^{-12}$  seconds; the masses are estimated as 7, 4.9 and 3.5 Gev. In a third experiment the collision of a neutrino with a nucleon produced an unknown neutral particle with a lifetime on the order of  $6 \times 10^{-12}$  seconds and a mass in the range of 1.6-2.5 Gev. Only the first experiment can be considered as definitely establishing the existence of heavy leptons. The importance of these experiments lies partially in the contribution they will make to testing the theory of the unity of electromagnetic and weak interactions.

AUTHOR: None

ORG: None

TITLE: "Track of Charmed Particle Discovered"

SOURCE: Peking KAO-NENG WU-LI [HIGH ENERGY PHYSICS] in Chinese No 3, Sep 77  
p 5

ABSTRACT: The existence of a charmed meson and a charmed baryon, based on analysis of decay products, was reported in this journal in early 1976. At the end of 1976 the track of a charmed particle was observed. A proton beam struck a target, producing neutrinos. One of these reacted with an atomic nucleus in an emulsion chamber, producing a number of charged particles, one of which had a path 0.18 mm long, corresponding to a lifetime of  $5 \times 10^{-13}$  seconds, and decayed by the weak process. The decay products were 2 charged kaons and a charged pion, along with a neutral strange particle, either  $\Lambda$  or  $K^0$ . Such short lifetimes have only been measured in emulsion chambers.

AUTHOR: FANG Shou-hsien [2455 1343 6343]

ORG: None

TITLE: "What is a Storage Ring?"

SOURCE: Peking KAO-NENG WU-LI [HIGH ENERGY PHYSICS] in Chinese No 3, Sep 77  
pp 6-8

ABSTRACT: A storage ring is a device for producing collisions between beams of accelerated particles moving in opposite directions. Such rings accumulate particles, accelerate them and store them until needed for collision. Some of the types of collisions which have been produced using them are: proton-proton, proton-positron, proton-antiproton and electron-proton. The main advantage of these machines is that the collision technique allows higher energies than are presently attainable in other types of device. However, storage rings will not replace synchrotron devices, since they are limited to only a few types of collisions, cannot work with the secondary products of the collisions, and have space limitations on the types of experiments that can be conducted.

AUTHORS: LU T'an [7120 0960 3508]  
LO Liao-fu [5012 6697 1788]

ORG: None

TITLE: "From the Atomic Nucleus to Partons"

SOURCE: Peking KAO-NENG WU-LI [HIGH ENERGY PHYSICS] in Chinese No 3, Sep 77  
pp 9-13, 30

ABSTRACT: The scattering experiments which led to the discovery of the atomic nucleus and of its constituents are described. High energy bombardment led to the discovery of further particles beyond the neutron and proton, including a large number of baryons and mesons. The structural basis of these particles is the quarks (stratons) of which there are 4, plus 4 antiparticles. Mesons consist of 1 quark and 1 antiquark, baryons of 3 quarks. All strong processes involve creation or annihilation of a quark-antiquark pair. Experiments in China in 1965-66 produced results that were in agreement with analysis of weak and electromagnetic processes involving hadrons in terms of quarks. Anomalously high probabilities of nonelastic scattering have been explained in terms of collision of the scattered particle (electron) with a free parton in the nucleus, which then recoils and reacts with other partons to form hadrons. The partons are apparently different from quarks; they have spins of  $1/2$ , whereas the quarks have spins which are multiples of  $1/3$ .

AUTHOR: None

ORG: None

TITLE: "Summer Conference on the Theory of Fundamental Particles Held at Huang-Shan; American Physicist C. C. Ting Visits China"

SOURCE: Peking KAO-NENG WU-LI [HIGH ENERGY PHYSICS] in Chinese No 3, Sep 77  
p 8

ABSTRACT: A nationwide conference on the theory of fundamental particles was held on 1-20 August at Huang-Shan [7806 1472], Anhui Province. Topics covered included the quark model, new particles, and weak interactions. Foreign work was reviewed, specialized papers presented, and directions for future research discussed. The American physicist Yang Chen-ning [2799 2182 1337] visited the conference and discussed such topics as the magnetic monopole.

The American physicist Ting Chao-chung [0002 5128 0022] visited China beginning 10 August. While in Peking he described his work in Europe and the nature of the West German PETRA and U.S. ISABELLE storage ring facilities.

AUTHOR; Ni Kuang-chung [0242 0342 3518]

ORG: Fu-tan University

TITLE: "In Terms of Left-Right Symmetry"

SOURCE: Peking KAO-NENG WU-LI [HIGH ENERGY PHYSICS] in Chinese No 3, Sep 77  
pp 14-16, 19

ABSTRACT: Conservation of parity involved mirror-image symmetry. It was thought that conservation of parity applied in all nuclear processes until the so-called "tau-theta puzzle" arose. Decay of both the tau and theta mesons involved a change in parity. It has since been shown that parity is not conserved in weak interactions. In such cases the idea of conservation of parity is replaced by that of CPT invariance.

AUTHOR: TAI Wen-sai [2071 2429 6357]

ORG: Department of Astronomy, Nanking University

TITLE: "Supernovas"

SOURCE: Peking KAO-NENG WU-LI [HIGH ENERGY PHYSICS] in Chinese No 3, Sep 77  
pp 17-19

ABSTRACT: Supernovas, stellar explosions which emit much more light and energy than ordinary novas; are also much less common than them, occurring on average once every few decades within a given nebula. Chinese astronomical records include a number of supernovas, which were also observed in Europe. About 120 possible supernova remnants have been discovered, including certain pulsars and expanding gas clouds. When a supernova is observed it is possible to determine the speed of ejection of gas by the Doppler shift in certain spectral lines, although this is rendered more difficult by fact that in supernovas the lines are extremely broad. Theories explaining supernova explosions include those of: gravitational collapse of the star following emission of large quantities of neutrinos; precipitation of neutrinos in the outer segments of the star which have been made dense by shock waves, thus causing the expansion of the outer shell; and reaction of protons in iron nuclei with high energy electrons, resulting in emission of neutrons.

AUTHOR: WU Shih-ch'in [0702 1102 0530]

ORG: None

TITLE: "The Preinjector"

SOURCE: Peking KAO-NENG WU-LI [HIGH ENERGY PHYSICS] In Chinese No 3, Sep 77  
pp 28-30

ABSTRACT: The preinjector is the first stage in a series of stepped accelerators. It generally accelerates particles to about 750 kev. The current should be several tens to several hundred mA and the pulse duration several hundredths of a microsecond, with a frequency of a few to a few tens per second. The components are: a pulsed ion source, a high-gradient accelerator and a highly stable high voltage source. Diagrams of the ion source, two possible types of accelerator tube, the doubler circuit and the high-voltage oscillator and stable voltage source are included.

8480

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MECHANICS JOURNAL

AUTHOR: LIANG Shou-p'an [2733 1343 2857]

ORG: None

TITLE: "A Stepped Vibration Isolation System"

SOURCE: Peking LI-HSUEH HSUEH-PAO [MECHANICS JOURNAL] in Chinese No 2, Apr 78 pp 87-91.

ABSTRACT: The vibration isolation systems for airborne instruments possess relatively low natural frequencies so that they are able to isolate and protect the instruments from the damaging effects of the high frequency vibrations. While the aircraft are being transported on board ships, however, the low frequency vibrations (such as one due to the rotating screw) that exist on ships can cause the said vibration isolation systems to resonate and cause damage to the instruments. This problem can be solved by a relatively simple modification of the existing system; namely, by addition of a pair of stoppers. The behavior of the modified system is analyzed and the pertinent parameters are illustrated with numerical examples. It is shown that the stepped vibration isolation system can under the resonance condition prevent the amplitude from increasing without bound, holding it down to within the practical safe range. The system is shown to behave exactly the same as an ordinary system at frequencies other than resonance frequency.

AUTHOR: LIU Hsian-chih [0491 0341 1807]

ORG: Shangtung Engineering College

TITLE: "Two-shaft Balance System Analysis of the Second Order Reciprocating Inertia Forces for Plane Crankshaft Eight-cylinder V-type Internal Combustion Engines"

SOURCE: Peking LI-HSUEH-PAO [MECHANICS JOURNAL] in Chinese No 2, Apr 78 pp 92-101

ABSTRACT: The concept of two-shaft balance system for plane crankshaft eight-cylinder V-type internal combustion engine was derived from the concept of four-shaft balance system (discussed in a previous paper by the same author) by applying the principles concerning the transformation of the force system. Two-shaft equivalent system was derived for the case of V-angle ranging from 0 to 60 degrees and one ranging from 60 to 180 degrees and also a special case of V-angle being equal to 60 degrees. The formulas defining various parameters of the two-shaft equivalent system are derived and numerical values of the parameters are tabulated. The concepts of the four-shaft and two-shaft balance systems are compared and their advantages and disadvantages are also discussed.

AUTHOR: WU Yun-p'eng [0702 0061 7720]  
TS'AI Chung-chun [5591 1813 6511]

ORG: WU of Chungking University, TS'AI of the First Hospital of the  
Third Military Medical College

TITLE: "Medication Applications of Hydro-elastic Waves"

SOURCE: Peking LI-HSUEH HSUEH-PAO [MECHANICS JOURNAL] in Chinese No 2,  
Apr 78 pp 102-106

ABSTRACT: An experimental bile duct vibrator for removal of gall stones from hepatic ducts has been constructed and clinically tested for nearly a year. The preliminary results of the test showed that quite significant medical treatment effect could be achieved. This paper discusses the mechanics aspects of the hydro-elastic wave propagation in an elastic tube system simulating the hepatic ducts. A schematic diagram of the bile duct vibrator illustrating the parts and principle of the device and photographic plates illustrating 1) the external view of Model DZ-1 Bile Duct Vibration Treatment Device, 2) an exposed view of the interior of the vibrator, 3) some of the stones discharged as a result of treatment with the vibrator, 4) an X-ray photo of the right liver lobe before treatment, and 5) an X-ray photo of the same after treatment are

[continuation of LI-HSUEH HSUEH-PAO No 2, Apr 78 pp 102-106]

also included. The analysis confirms the soundness of the principle on which the design of the device is based and also provides guidelines concerning the selection of the frequency and amplitude of the wave that is to be used for the treatment. This concept may also be applied to the removal of stones from the urinary system or to the treatment of thrombosis, etc.

AUTHOR: LO En [5012 1869]  
SHAO Cho-min [6730 0587 3046]  
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TITLE: "Generalized Variational Principle and Stress Analysis for the Composite Type Ribbed Shallow Hypar Shells"

SOURCE: Peking LI-HSUEH HSUEH-PAO [MECHANICS JOURNAL] in Chinese No 2, Apr 78 pp 107-124

ABSTRACT: A composite ribbed shallow hypar shell composed of four rectangular pieces was studied. Three equations governing the equilibrium of the system were derived from application of the generalized variational principles in terms, respectively, of total potential energy, excess energy and mixed type. The equation pertaining to the mixed type was further reformulated in terms of the stress function and the deflection. The boundary conditions and the joint conditions along the intersecting ridge lines were derived. The solution was then obtained from application of the variational difference method. The results thus obtained were shown to compare favorably with

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those obtained from experiment. The roof of a warehouse at Ta-lien harbor was designed and constructed based on the results of analysis of this study. The roof consists of double-span composite shallow hypar shell, each span consisting of four pieces of hypar shell having the horizontal dimensions of 23 meters x 23 meters and a ridge height of 3.834 meters. The work was finished in 1971 and the roof has held up well so far.

AUTHOR: CH'IEN P'ei-feng [6929 1014 7364]  
SU Wen-ts'ao [5685 2429 5679]  
CHANG Hsi-te [1728 1885 1795]  
YANG Ya-ti [2799 0068 1717]

ORG: All of The Institute of Engineering Mechanics, Chinese Academy of Sciences

TITLE: "Longitudinal Wave Stresses in Chimney Under Earthquake Action"

SOURCE: Peking LI-HSUEH HSUEH-PAO [MECHANICS JOURNAL] in Chinese No 2, Apr 78 pp 125-134

ABSTRACT: At present in this country as well as abroad, the design of chimneys takes into consideration only the horizontal motion of the ground due to earthquakes. As a result of careful observation and study of the damages caused by earthquakes of brick chimneys over the past 10 years or so, the authors discovered that many of the damages could not be explained very well from the conventional view point dealing only with the transverse forces. A new view point is being proposed that the longitudinal wave stresses caused by the earthquake appears to play a more important role than the bending stresses due to the horizontal movement of the ground in causing destruction or damage to the chimney. From the calculated results

[continuation of LI-HSUEH HSUEH-PAO No 2, Apr 78 pp 125-134]

of the induced stresses due to the longitudinal wave the authors were able to derive the mechanism of chimney destruction and explain satisfactorily many of the actually observed conditions of damage and destruction. Further study of this subject is important especially in this country where brick chimneys are being used now and will be used for some time to come.

AUTHOR: PAI I-lung [4101 0110 7893]

ORG: The Institute of Mechanics, Chinese Academy of Sciences

TITLE: "Attenuation of Stress Waves in Linear Hysteretic Body"

SOURCE: Peking LI-HSUEH HSUEH-PAO [MECHANICS JOURNAL] in Chinese No 2,  
Apr 78 pp 135-146

ABSTRACT: In physical analyses of the propagation of shock waves through rocks, an understanding of the hysteretic stress-strain relation of the rock appears to be the key to understanding the attenuation mechanism of the stress waves in the rock. Using a linear hysteresis model and employing Laplace transform and asymptotic expansion an analytical solution of the propagation of a spherically symmetric wave through rock was obtained. A special solution was also obtained for the propagation of stress wave that attenuated according to the rule  $\hat{p} \propto (r)^{-1}$ , where the attenuation index  $l > 1$ . From the fact that the characteristics of the solution obtained by this study such as self-similarity of the wave form, the wave form characteristics, the elapsed time-half lifetime relation, the maximum values of the mechanic and dynamic parameters, etc. were found to agree fairly well with the observed results as well as with the values obtainable from the

[continuation of LI-HSUEH HSUEH-PAO No 2, Apr 78 pp 135-146]

empirical formulas, it was suggested that the hysteresis of the rock might be the major mechanism that governs the attenuation of stress wave as it propagates through a rock.

AUTHOR: LIU Chien-pang [0491 1696 6721]  
HSIA Sheng-chieh [1115 3932 2638]

ORG: Both of The Institute of Mechanics, Chinese Academy of Sciences

TITLE: "A Plane-plate Type Laser Shearing Interferometer and Its Application in Flow-field Measurements"

SOURCE: Peking LI-HSUEH HSUEH-PAO [MECHANICS JOURNAL] in Chinese No 2, Apr 78 pp 147-152

ABSTRACT: The Mach-Zehnder interferometer that is commonly used for the measurement of flow field has many shortcomings such as susceptibility to vibration, small view field, shallow depth of measurement, low intensity of the light source and the consequent severe requirements it places on its environment conditions and the difficulty of continuous high speed recording. A plane-plate type laser shearing interferometer has been constructed and tested. This device which is devoid of all the shortcomings of the conventional interferometer promises to find many applications in the field of aerodynamics, fluid mechanics, physics of explosion, heat transfer, laser physics, etc. It is especially suitable for measurement of the supersonic flow field. The construction, the principle of operation, the experimental

[continuation of LI-HSUEH HSUEH-PAO No 2, Apr 78 pp 147-152]

results and the advantages and disadvantages of the device are discussed thoroughly. Included are photo plates containing six photographs illustrating 1) the beam expansion collimator assembly on tripod, 2) parallel interference fringes due to a field of homogeneous air, 3) interference patterns of an oblique shock wave in a supersonic flow field, 4) interference patterns of the convection flow field about a palm, 5) the double image of a hot nail and 6) the interference patterns of the same nail obtained from an improved device in which an air gap between a prism and a mirror replaces the plane-plate.

AUTHOR: KUO Pen-yu [6753 2609 3842]  
KUO Pen-ch'i [6753 2609 3823]

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Chiu-chiang Oil Refinery

TITLE: "Numerical Solution of Navier-Stokes Equations"

SOURCE: Peking LI-HSUEH HSUEH-PAO [MECHANICS JOURNAL] in Chinese No 2,  
Apr 78 pp 153-157

ABSTRACT: Many methods have been advanced for finding numerical solution of the Navier-Stokes equations but few could prove its error estimation. The difficulties lay in the treatment of the non-linear terms and the pressure-density ratio. Another approach to the solution of Navier-Stokes equations is to solve directly a Poisson's equation for the pressure field. As an extension to the previous work done by the first author a problem concerning two-dimensional Navier-Stokes equations was discussed. Three theorems concerning the estimation of the magnitude of errors are stated and proved. Similar theorems can also be formulated for a three-dimensional problem.

AUTHOR: CHIN Wen-lu [6855 0795 7627]

ORG: Department of Exploration and Design, Hang-chou Bureau of Construction

TITLE: "Calculation of Hyperbolic Paraboloid-shaped Roofs of Cable Nets with Large Initial Sag"

SOURCE: Peking LI-HSUEH HSUEH-PAO [MECHANICS JOURNAL] in Chinese No 2, Apr 78  
pp 158-161

ABSTRACT: This is an extension of a study previously made in which a general solution of a problem concerning hyperbolic paraboloid-shaped roof consisting of cable nets having an elliptic base was obtained. In the previous study the difference between the axial tension and the horizontal tension of the cable was considered negligible. Such treatment would lead to relatively large errors if the initial sag were of considerable magnitude. This study takes into consideration the said difference and discusses the modifications that must be made.

AUTHOR: MA Te-lin [7456 1795 2651]

ORG: None

TITLE: "Generalized Stress Intensity Factor Criterion of Fracture for Combined Loading"

SOURCE: Peking LI-HSUEH HSUEH-PAO [MECHANICS JOURNAL] in Chinese No 2, Apr 78 pp 162-166

ABSTRACT: Development of fracture in an engineering structure is often quite arbitrary, independent of the direction of the applied external force. As a result of theoretical and experimental studies concerning the complex fracture of structure carried out over the past 10 years or so several important criteria of fracture have been formulated including the maximum circumferential stress criterion, the strain density factor criterion and the maximum energy release rate criterion. However, so far there has not been any criterion for fracture under combined types of loading that is based on the stress intensity factor, a very well known concept. This article proposes a concept of the generalized stress intensity factor and a criterion for complex fracture based on the generalized stress intensity factor is obtained. The generalized stress intensity factor criterion is shown to be a natural extension of the simple stress intensity factor criterion and also a logical extension of the

[continuation of LI-HSUEH HSUEH-PAO No 2, Apr 78 pp 162-166]

maximum circumferential stress criterion. The generalized stress intensity factor criterion is shown to be identical to the maximum circumferential stress criterion under a combined load of I and II types. Predictions made by the new criterion are shown to agree quite well with the experimental results under a combined load of I and III types. Other combined load conditions are also discussed.

AUTHOR: SUN Hsun-fang [1327 6064 2455]

ORG: Southwestern Communication University

TITLE: "The Pop-in Subcritical Crack Growth Due to Metal Inhomogeneity"

SOURCE: Peking LI-HSUEH HSUEH-PAO [MECHANICS JOURNAL] in Chinese No 2,  
Apr 78 pp 167-170

ABSTRACT: Traditionally the brittle fracture criterion discussed in Mechanics of Fracture was written with respect to a homogeneous substance. And the matter concerning inhomogeneity of substances was taken care of through the introduction of a safety factor. This practice oversimplifies the problem by ignoring completely the very complicated problems inherent to the inhomogeneity of substances and therefore should be construed as unsafe and unsound. Based on the experimental observations some of the phenomena of crack growth attributable to the inhomogeneity of substance are described including 1) pop-in type subcritical crack growth, and 2) the effect of pop-in type subcritical crack growth on structure containing initial flaws. Suggestions are made concerning the kind of stress intensity factor that should be used in formulation of the criterion and the types of experimental measurements that should be carried out in the future for a better understanding of the subject.

OCEANOLOGIA ET LIMNOLOGIA SINICA

AUTHOR: TS'AI Ai-chih [5591 1947 2535]

ORG: Institute of Oceanology, Academia Sinica

TITLE: "On the Formation of Chih-fu Tombolo"\*

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese  
No 1, Jan 78 pp 1-14

TEXT OF ENGLISH ABSTRACT: Analyses of the sedimental characteristics, geomorphological development and hydrodynamic elements along the coastal zone in Chih-fu Tao (Chefoo Island) have proven:

1. The formation of tombolo was mainly due to the accumulation of sands and gravels along the coast, sands being from the estuary of the Chia River and transported northward, gravels being the erosion products of Chih-fu Tao  $Q_2^{d-pl}$  and transported southward.
2. Height differences of the four gravel bars tombolo are varied at each section, the maximum being over 1 meter. Wave elements played an important role in the height difference, which was erroneously reported as a result of either the emergence or the submergence of the shoreline.
3. The pattern model as proposed by O. K. Leontyev that the gravel bars push toward

[continuation of HAI-YANG YU HU-CHAO No 1, Jan 78 pp 1-14]

the bay is unsound.

\* Contribution No 411 from the Institute of Oceanology, Academia Sinica. The following participated in portions of the present study: TS'AI Yueh-o [5591 2588 1230], LI Ch'eng-chih [2621 2052 3112], CH'EN Chen-kao [7115 3791 4108], LI Pen-chao [2621 2609 0340] and HOU Pao-ch'ing [0186 1405 1987].

AUTHOR: CHAO Sung-ling [6392 2646 7881]  
YANG Kuang-fu [2799 0342 1788]  
TS'ANG Shu-hsi [5547 2885 3305]  
CHANG Hung-ts'ai [1728 1347 2088]  
HUANG Ch'ing-fu [7806 1987 4395]  
HSIA Tung-hsing [1115 2639 5281]  
WANG Yung-chi [3769 3057 0679]  
LIU Fu-shou [0491 1788 1108]  
LIU Ch'eng-fu [0491 2052 1788]

ORG: CHAO, YANG, TS'ANG, CHANG, HUANG all of the Institute of Oceanology, Academia Sinica; HSIA, WANG, LIU Fu-shou and LIU Ch'eng-fu all of the First Institute of Oceanographical Research of the State Oceanography Bureau

TITLE: "On the Marine Stratigraphy and Coastlines of the Western Coast of the Gulf of Po-hai\*\*

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese No 1, Jan 78 pp 15-25

TEXT OF ENGLISH ABSTRACT: Three marine formations are recognized from the Quaternary sediments (above 100 meters) of the western coast of the Gulf of Po-hai.

The  $C^{14}$  method and paleomagnetic measurements were used to estimate the age of

[continuation of HAI-YANG YU HU-CHAO No 1, Jan 78 pp 15-25]

each marine formation. The first marine formation existed between 102,000-70,000 years B.P. belonging to Riss-Würm interglaciation. The second was between 39,000-23,000 years B.P. corresponding to the interstadial of Würm glaciation. The third was between 8,000-2,000 years B.P. corresponding to the postglacial deposition.

The three marine formations indicated that three transgressive sequences occurred in the western coast of the Gulf of Po-hai. The first transgression reached the vicinity of Hsieh-kung-t'ing in the western part of Ts'ang-chou city, here termed Ts'ang-chou transgression. The second transgression is greater in extent than the first, its boundary could reach Hsien-hsien country, here termed Hsien-hsien transgression. The third transgression, here termed Huang-hua transgression, is less in extent than the first and the second, and is distributed only in the zone of Huang-hua, Ching-hai, Tientsin. Therefore, we recognized three paleo-coastlines in this area.

\* Contribution No 412 from the Institute of Oceanology, Academia Sinica.

AUTHOR: MAO Jui [3029 6904]

ORG: Limnological Division, Institute of Geography, Kiangsu

TITLE: "Preliminary Experimental Study of Evaporation From Water Surface of Lake T'ai and Lake T'uan-kuei, Kiangsu Province"\*

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese No 1, Jan 78 pp 26-35

TEXT OF ENGLISH ABSTRACT: This paper deals with the experimental observation of evaporation from water surface of Lake T'ai and Lake T'uan-kuei, which was sponsored by the Experimental Station for Lake T'uan-kuei, the former Nanking Institute of Geography, Academia Sinica. The analysis of experimental data from 1957 to 1969 for these lakes and for the evaporation tank (20 m<sup>2</sup>) gives rise to the following points:

1. The empirical formula for evaporation and refined evaporimeter coefficient is derived from the analysis of the evaporation tank data obtained at the experimental stations for Lake T'ai and Lake T'uan-kuei, which are representative of the lower and middle reaches of the Yangtze River basin.
2. From the principle of heat balance, this paper proposes the difference value method for the computation of evaporation from lakes. This method is rational by examination and may be applicable to lakes in the Lake T'ai region.

[continuation of HAI-YANG YU HU-CHAO No 1, Jan 78 pp 26-35]

3. Annual evaporation from Lake T'ai and Lake T'uan-kuei in comparison with the evaporation tank is similar, but monthly evaporation between them is significantly different. The annual variation of these ratios ranges from 0.8 to 1.1. In comparison the ratios for different types of lakes are different, therefore the routine coefficient requires certain refinement.

Discussions are on problems of the annual distribution of evaporation from the surface of Lake T'ai, the evaporimeter coefficient and the coefficient of heat exchange, etc.

\* The present study was done under the guidance of SHIH Ch'eng-hsi [2457 2052 3356]. Others taking part were P'U P'ei-min [3450 1014 3046], CH'U Yu-hsiung [0575 5940 7160], KU Ting-hsi [7357 0002 1119], SHIH Fu-hsiang [0670 1788 4382], CH'EN Chia-lun [7115 0857 0243], et al.

AUTHOR: CH' IEN Wan-ying [3383 3834 5391]  
CHOU Chia-i [0719 1367 5030]  
LI Chi-liang [2621 4949 0081]  
YAO Yun-ling [1202 0061 3781]  
CH' IU Li-sheng [6726 4409 3932]

ORG: All of the Department of Chemistry, Shantung College of Oceanology

TITLE: "Reduction-Aeration Preconcentration At Ordinary Temperature and Cold Vapor Atomic Absorption Method for the Determination of Mercury at PPT Level in Sea Water and Natural Waters"\*

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese No 1, Jan 78 pp 36-42

TEXT OF ENGLISH ABSTRACT: A reduction-aeration preconcentration procedure employing a porous globulous glass bubbler and using  $\text{KMnO}_4\text{-H}_2\text{SO}_4$  as a trapping solution at room temperature ( $8\text{-}20^\circ\text{C}$ ) together with a flameless cold vapor atomic absorption method (using model "590" mercury vapor measuring apparatus) has been developed for the determination of mercury at ppt level in sea water and natural waters.

The reduction-aeration preconcentration procedure at room temperature is convenient for laboratory staff operating on board ship and in the shore laboratory owing to

[continuation of HAI-YANG YU HU-CHAO No 1, Jan 78 pp 36-42]

the simplicity of instrumentation. This simple technique can be used successively for the determination of extremely low mercury levels in sea water and natural waters.

This technique permits water samples to be analyzed for mercury down to 2 ng Hg liter<sup>-1</sup> with a 1-liter sample and an aeration time of 30 minutes.

The precision of analysis reported as a coefficient of variation is 18-22% at 5-10 ng Hg liter<sup>-1</sup>, 16% at 15 ng Hg liter<sup>-1</sup>, and 5-10% at 35-164 ng Hg liter<sup>-1</sup>.

The determination of both inorganic and total mercury in sea water with this technique shows that the recovery percentage is satisfactory.

\* Professor HO Ch'ung-pen [6378 1504 2609] reviewed the manuscript of the present study.

AUTHOR: LI P'ei-ch'uan [2621 1014 3123]  
LI Chin-ling [2621 6855 1545]

ORG: Both of the Institute of Oceanology, Academia Sinica

TITLE: "A Study of the Method of the Determination of the Gross Beta Radioactivity in Sea Water with Barium Chloride-Ferric Ammonium Alum"\*

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese No 1, Jan 78 pp 43-48

TEXT OF ENGLISH ABSTRACT: The method of determination of the gross beta radioactivity in sea water was studied using the radioactivity of fall-out as an isotopic tracer. Experiments showed that it was feasible to concentrate radionuclides in sea water with Barium chloride-Ferric ammonium alum.

The related factors in this determination were studied and the results obtained are summarized as follows:

1. The recovery of radioactivity varies with the changes of pH: 20-30% is obtained with pH from 4.0 to 4.8, 95% with pH 6.0-7.8, 80% with pH 8.2-9.2, 95% with pH 9.5 or over. The 70-80% recovery as reported by Miyake corresponds to that between pH 8.2 and pH 9.2, because at 9.5 or over a heavy whitish  $Mg(OH)_2$  precipitate formed makes the determination more difficult, although the recovery obtained may be high.

[continuation of HAI-YANG YU HU-CHAO No 1, Jan 78 pp 43-48]

2. Heating increases the rate of recovery considerably. Two to six hours of settling after boiling gives a recovery of 95%, while recovery is only 80% at 15-25°C for the same period of settlement. A recovery of 88% was given at room temperature after standing for 24 hours. So the heating process may be omitted on shipboard.

3. The effect of the amount of precipitant used on the recovery rate is to a considerable extent not appreciable. In order to increase the volume of sea water to be determined and save more time on determining, a minimum amount of precipitant to be used must be sought. Experiments show that the addition of 2.5 mg  $Fe^{+++}$  and 2.5 mg  $Ba^{++}$  in 1 liter sea water may increase the amount of sea water from 1 to 4 liters, with recovery of 88% as a checking reference.

This method is simple enough to be used in determining the gross beta radioactivity in polluted sea water.

\* Contribution No 413 from the Institute of Oceanology, Academia Sinica. Thanks is extended to comrade CHI Ming-hou [4764 2494 0230].

AUTHOR: CH'EN Ching-ts'un [7115 2417 1317]  
LIN Yung-t'ai [2651 3057 3141]  
WU Tiao-t'ien [0124 2220 3944]

ORG: All of the Institute of Hydrobiology, Hupeh Province

TITLE: "Regularities of Succession of Predatory Fish Population in Reservoirs of the Middle and Lower Yangtze Valley, with a Discussion on the Methods of Population Control"

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese No 1, Jan 78 pp 49-58

TEXT OF ENGLISH ABSTRACT: The authors distinguish the predatory fish in reservoirs of the middle and lower Yangtze Valley into a benthic group and a pelagic group, with the latter group further subdivided into the Erythroculter type and the Elopichthys type. After the filling of the reservoirs, with the lapse of time, predatory fish display a phenomenon of succession with definite regularities. The mode of succession depends on the hydrological conditions, the composition of the original fish fauna before filling of the reservoir, and the degree of human interference. An integrated pattern of succession is: benthic group → Erythroculter type of the pelagic group → Elopichthys type → Erythroculter type again, when Elopichthys is put under control.

[continuation of HAI-YANG YU HU-CHAO No 1, Jan 78 pp 49-58]

After analyzing the main feature of our reservoir fisheries--artificial stocking and the extent of damage caused by predatory fish, the authors consider that the policy of destroying them as much as possible should be adopted. Approach to the control of predatory fish population in principle is made, and some of the suggested ways and means have already been proved to be effective in practice.

AUTHOR: T'AN Chih-yuan [6223 2535 3293]  
KAO Hung-hsu [7559 3163 4872]  
SU Hsing-hui [1372 2502 1979]

ORG: All of the Institute of Oceanology, Academia Sinica

TITLE: "The Quantitative Distribution of Sticholonche Zanclea in the Western Part of the East China Sea"\*

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese No 1, Jan 78 pp 59-66

TEXT OF ENGLISH ABSTRACT: Sticholonche zanclea Hertwing has the following patterns of distribution in the East China Sea. It occurs in greater numbers between longitudes 122°-123°E. Its northern boundary of distribution extends farther north during summer and autumn, regressing in winter and spring. The total number of individuals per cubic meter of water is greater in summer than in winter. Denser concentration is found in the surface layers than in the bottom layers. A direct relationship exists between its quantitative distribution and seasonal variation in temperature--it increasing in number with seasonal increase in water temperature and vice versa. It occurs in great abundance in waters rich in phosphate and phytoplankton. Run-offs seem to exert some influence in increasing its production. Based on its widely

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recorded occurrence in other parts of the world and on its features of distribution in the East China Sea, we consider it to be a widely distributed warm-water species.

\* Contribution No 415 from the Institute of Oceanology, Academia Sinica.

AUTHOR: TSENG Ch'eng-k'uei [2582 0701 1145]  
CHANG Te-jui [1728 1795 3843]

ORG: Both of the Institute of Oceanology, Academia Sinica

TITLE: "On Two New Porphyra From China"\*

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese  
No 1, Jan 78 pp 76-83

EXCERPT FROM ENGLISH ABSTRACT: Two new Porphyra are described, namely Porphyra  
guangdongensis sp. nov. of the section Dentata Tseng et T. J. Chang and P. katadai  
Miura, var. hemiphylla var. nov. of the section Edentata Tseng et T. J. Chang, both  
of the subgenus Euporphyra Rosenv., type specimens all deposited at the herbarium  
of the Institute of Oceanology, Academia Sinica.

\* The following took part or aided in the present study: CHENG Shu-tung [6774 2885  
2767], CHENG Pao-fu [6774 1405 4395], T'ANG Chih-chieh [0781 1807 3381], WANG Li-  
ming [3769 4539 2494], SUNG Hua-chung [1345 5478 0022] and FENG Ming-hua [7458 2494  
5478].

AUTHOR: WANG Yung-ch'uan [3769 3057 1557]  
P'AN Kuo-ying [3382 0948 3841]  
CHIANG Fu-k'ang [5592 4395 1660]  
LIN Chi-hsiang [2651 1015 4382]  
P'AN Hsiang-ch'uan [3382 4382 3123]

ORG: WANG, P'AN Kuo-ying, CHIANG, LIN of the South China Sea Institute of Ocean-  
ology, Academia Sinica; P'AN Hsiang-ch'uan of the Shan-t'ou District Marine Aqua-  
culture Station

TITLE: "On Artificial Cultivation of Porphyra Guangdongensis"\*\*

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese  
No 1, Jan 78 pp 85-88

TEXT OF ENGLISH ABSTRACT: Since 1974 we have investigated the cultivation of local  
species of Porphyra, namely, P. guangdongensis Tseng et T. J. Chang, in the Shan-  
t'ou district of Kwangtung province. Our studies for the last three years show that  
this purple laver is better adapted to higher temperatures and a more protected  
region than the other species now under cultivation in our country. Porphyra  
haitanensis T. J. Chang et B. F. Zheng was introduced to the Shan-t'ou district  
some years ago, average production per mu (667 m<sup>2</sup>) varying from 13.5 kg to 81 kg  
(dry weight of processed laver). Our experiments on the production scale show that

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with P. quangdongensis, the average production per mu reached 107 kg and 144 kg in two different regions.

This is due to the fact that with the Kwangtung Porphyra, spore-collecting and cultivation can be effected at water temperature as high as 28-30°C, about one month earlier than the Fukien Porphyra, thus prolonging the growth period, resulting in higher yield. The Kwangtung species seems to be better adapted to growing in the inner parts of the bays, where it grows well, whereas the Fukien species requires the more agitated environment of the outer part of the bays.

\* The following aided or took part in the present study: FAN Kung-chu [2868 1872 3515] d. 20 Dec 1974, TSENG Ch'eng-k'uei [2582 0701 1145], CHANG Te-ju [1728 1795 3843], FEI Hsiu-keng [6316 0208 4837], TS'UI Kuang-fa [1508 1684 3127].

AUTHOR: LIU Jui-yu [0491 3843 3768]  
WANG Yung-liang [3769 3057 5328]

ORG: Both of the Institute of Oceanology, Academia Sinica

TITLE: "Description of a New Genus and Two New Species of Stomatopod Crustacea From the South China Sea"\*

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese No 1, Jan 78 pp 89-94

EXCERPT FROM ENGLISH ABSTRACT: While studying the collection of stomatopods from the South China Sea, we came across some specimens with characteristics markedly different from all the other known stomatopod genera or species. A detailed examination revealed that they represent two distinct species belonging to a new genus, the descriptions of which are given.

Both the holotypes and paratypes of these two new species are deposited in the Institute of Oceanology, Academia Sinica, Ch'ing-tao, China.

\* Contribution No 417 from the Institute of Oceanology, Academia Sinica. Thanks to MENG Chao-hung [1322 2507 4540] and SUNG Hua-chung [1345 5478 0022].

AUTHOR: LIN Kuang-yu [2651 0342 1342]

ORG: Institute of Oceanology, Academia Sinica

TITLE: "A New Species of Cylindrobulla (Opisthobranchia) of the Hsi-sha Islands, Kwangtung Province, China"\*

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese No 1, Jan 78 pp 95-98

EXCERPT FROM ENGLISH ABSTRACT: In May, 1975, the Institute of Oceanology, Academia Sinica, carried out a marine biological survey in the inter-tidal zone of the Hsi-sha Islands, Kwangtung Province, China. Among the many specimens collected there were two specimens of shell-bearing Opisthobranchia from the "Caulerpa microfauna" at Chin-yin-tao, here described as a new species belonging to the rare genus Cylindrobulla Fischer, 1856.

While this species is for the first time recorded from China, up to 11 species have been described from various parts of the world.

\* Contribution No 418 from the Institute of Oceanology, Academia Sinica. Thanks to CHUANG Ch'i-ch'ien [5445 0796 6197] and WANG Kung-hai [3769 0361 3189].

AUTHOR: SHEN Shou-p'eng [3088 1108 1756]  
WU Pao-ling [0702 1405 6875]

ORG: SHEN of the South China Sea Institute of Oceanology, Academia Sinica; WU of the Institute of Oceanology, Academia Sinica

TITLE: "Preliminary Report on the Pelagic Polychaetes from Chung-sha Islands (Kwangtung Province, China)"\*

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese No 1, Jan 78 pp 99-107

TEXT OF ENGLISH ABSTRACT: This study presents results of our investigation on the Polychaeta of Chung-sha Islands--a group of South China Sea coral islands located about 230 miles southeast from Yu-ling-k'ang of the Hainan Island.

Specimens were collected by the South China Sea Institute of Oceanology, Academia Sinica, with plankton net in March and April, 1975, from Chung-sha Islands, South China Sea. Eleven species belonging to ten genera in four families have been identified, of which eight species, namely Naiades cantrainii delle Chiaje, Vanadis crystallia Greeff, Rhynchonerella gracilis Costa, Alciopina parasitica Claparede and Panaceri, Tomopteris rolasi Greeff, Sagittella kowalevskii Wagner, Travislopsis

[continuation of HAI-YANG YU HU-CHAO No 1, Jan 78 pp 99-107]

Lobifera Levinsen and Travisiopsis levinseni Southern are recorded for the first time from the Chinese waters.

\* Contribution No 419 from the Institute of Oceanology, Academia Sinica. Thanks to comrade WANG Hsing-yu [3769 5281 5713].

AUTHOR: TUNG Cheng-chih [5516 2973 0037]

ORG: Institute of Oceanology, Academia Sinica

TITLE: "On the Geographical Distribution of the Cephalopods in the Chinese Waters"\*

SOURCE: Peking HAI-YANG YU HU-CHAO [OCEANOLOGIA ET LIMNOLOGIA SINICA] in Chinese No 1, Jan 78 pp 108-116

TEXT OF ENGLISH ABSTRACT: A study on the geographical distribution of the Cephalopods in Chinese waters has been made. There are 62 species belonging to 16 families so far known, among which 47 species are neritic and the remaining oceanic. These species may be divided into four groups: 1) the stenoecic species, e.g. Sepia andreana, L. japonica, etc.; 2) the euryoecic species, e.g. Sepiella maindroni, Sepia subaculeata, etc., belonging to the neritic, and Ommastrephes sloani pacificus, Symplectoteuthis oualaniensis, etc., belonging to the oceanic; 3) the circumjacent species, e.g. Japetella diaphana, Octopus vulgaris, etc.; 4) the endemic species, e.g. Octopus quangdongensis, O. luteus, etc.

Three faunal regions of the neritic have been delimited roughly by the mouth of the Yangtze river and Hai-t'an Island, near P'ing-t'an, Fukien province:

Region 1--This region includes the northern China Seas, viz. the entire Yellow Sea and Po-hai. Fourteen species belonging to six families occurred; of these, Sepia

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esculenta and Loligo japonica are economically important.

Region 2--This region ranges from the mouth of the Yangtze river to the Hai-t'an Island, near P'ing-t'an. Twenty-nine species belonging to eight families occurred; of these, Sepiella maindroni is most economically important.

Region 3--This region ranges from the Taiwan Strait to the Pei-pu-wan. Fifty-seven species belonging to 15 families occurred; of these, Loligo chinensis is economically important.

The Cephalopod fauna of China is rich in both species and quantity. An Indo-West Pacific element is composed of great numbers and the northern-temperate elements are very few in number.

Compared with that of adjacent waters, the Cephalopod fauna of China is in close similarity with that of Japan, whether in endemic, common or economic species. Therefore, the author proposes that combining these two neritic faunas into a single one, namely the Sino-Japanese region instead of the X region (the Japanese region) delimited by Hoyle in 1886, is appropriate.

\* Contribution No 418 from the Institute of Oceanology, Academia Sinica.

8650

CSO: 4009

SCIENTIFIC EXPERIMENT

AUTHOR: KANG Yen [1511 1484]

ORG: None

TITLE: "Comrade Scientist CH'EN Ch'ih [7115 4609] Contributes All His Energy to His Fatherland"

SOURCE: Peking K'O-HSUEH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3, Mar 78 pp 1-3

ABSTRACT: Upon his graduation in 1948 from the Physics Department of Ch'ing-hua University, the twenty-one year old CH'EN Ch'ih was immediately hired by the physicist WANG Chu-ch'i [3769 4554 3305] to be his assistant instructor at the same department. Since then, he has served with distinction at the Chung-hsin Laboratory of An-kang Steel Mill, the Academy of Steel and Iron, etc. and has written more than 30 papers on metallurgy, crack dynamics, etc. His work on high temperature properties of Ni<sub>3</sub>Al won him international acclaim. Although he was shamelessly attacked and mistreated during the anti-intellectual and anti-scientists activities of LIN Fiao and the gang of four, his faith in socialism never wavered. Since 1976, he has been critically ill with cancer, but continues to work for modernization of China. The brief biography and several photos of the scientist are presented.

AUTHOR: WU Fang-chih [0702 2455 0037]

ORG: None

TITLE: "Yang-pa-ching Geothermal Experimental Power Station"

SOURCE: Peking K'O-HSUEH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3, Mar 78 pp 4-5, inside back cover

ABSTRACT: The town of Yang-pa-ching is located in the center of the basin of the same name, to the northwest of Lhasa, Tibet. In the famous "hot field" a cloud of steam can be observed rising from the flat basin, while modern glaciers have been discovered on the mountain peaks of above 5500-6000 m elevation to the south and the north of the basin. The Tsang-pu-ch'u River, supplemented mainly by the melt, forms the ideal source of cooling water for the power station. The construction of this first geothermal power station in China took only three months. The inside back cover includes a photo of the geyser and drawings depicting the power generation and cooling system of the electric power station, which is described in the paper.

AUTHOR: None

ORG: Geothermal Research Group, Department of Geological Geography, Peking University

TITLE: "Geothermal Resources"

SOURCE: Peking K'O-HSUEH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3, Mar 78 pp 6-7, 26

ABSTRACT: Following a description of the "hot field" of Yang-pa-ching on the southern foot of Tang-ku-la Mountains in Tibet, this paper explains the formation of internal heat of the earth and the technique of utilizing it to generate electricity. Geothermal resources in other parts of China, including the northern slope of the Himalayas, the northern foot of T'ang-ku-la Mountains, the western part of Yunnan Province, the eastern and southern provinces of China proper, and the province of Taiwan are only briefly mentioned.

AUTHOR: None

ORG: Hsiang-chung [Central Hunan] Bureau of Power Supplies

TITLE: "Explosion Pressure Connection: Special Welding Technique of Electrical Wires"

SOURCE: Peking K'O-HSUEH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3, Mar 78 pp 8-9

ABSTRACT: The bureau uses steel core aluminum wire for power transmission and steel wire for grounding. These wires are manufactured in a limited length and a 100 km 220KV power line requires a thousand plus connections. The power supply will fail if any of the connections should break off. This paper describes the technique of using plastic-B explosive to create a concentric force inside the aluminum casing of the wire to produce a plastic deformation of the metals so that the various strands of the wire and the casing are joined together to form a localized metallurgical union. Quality requirements of this technique and its advantages, compared with other welding techniques, are discussed.

AUTHOR: CHANG Yung-nien [1728 3057 1628]

ORG: None

TITLE: "Regulation of Power Network and Energy Storage"

SOURCE: Peking K'O-HSUOH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3,  
Mar 78 pp 10-12

ABSTRACT: In order that electrical power generation stations may be established in the vicinity of coal mines and hydroelectric power may be coordinated with thermoelectric power, high voltage transmission lines must be constructed to deliver electricity over long distances to where it is needed. As power consumption varies between day and night and from day to day while electric power generation cannot be changed with the variation of load requirements, techniques must be adopted to use the surplus power to pump water from a lower tank to an upper tank, to compress air, or to create steam from water during idle hours so that the hydraulic power of the water of the upper tank, the air pressure, and/or the steam may be used to generate extra electrical power to meet the needs of the peak hours of power consumption. The necessity of establishing a large scale power network and of storing power to adjust power production with power consumption and the techniques of accomplishing these objectives are explained.

AUTHOR: LIU Shang-lo [0491 1424 2867]  
HAN Ting-kuo [7281 1353 0948]

ORG: None

TITLE: "Epoxy Adhesives"

SOURCE: Peking K'O-HSUOH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3,  
Mar 78 pp 13-14

ABSTRACT: The secrets of the high power adhesion of epoxy adhesives is in the epoxy resin. A reticular stereo structure is formed when the epoxy resin interacts with a solidifying agent. This chemical interaction, the process of preparing the epoxy resin and the solidifying agents, the classification of epoxy adhesives, their advantages and uses are explained.

AUTHOR: None

ORG: Scientific and Technical Information Station of the Weighing Device Industry

TITLE: "Automatic Weighing Devices"

SOURCE: Peking K'O-HSUEH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3, Mar 78 pp 16-17

ABSTRACT: Devices for measuring weight include the three forms of balances, steelyards, and scales. With the advance of automation, the weight of many materials and products must be measured quickly, precisely, and automatically. As all weighing devices are composed of the three basic parts of the loading device, the weight transmitting device, and the weight indicating device, the degree of automation involves these structural parts as well. This paper introduces the basic theories of the mechanical scale utilizing electric power, the photoelectric balance, the photo-grating scale, and the light projection scale. The theory of the electronic scale has been explained in an article, appearing in the August 1977 issue of K'O-HSUEH SHIH-YEN.

AUTHOR: SUNG I-ch'ang [1345 1355 2490]

ORG: None

TITLE: "Modern Torpedoes"

SOURCE: Peking K'O-HSUEH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3, Mar 78 pp 20-21

ABSTRACT: Of all the ships sunk during World War II, fifty percent were by torpedoes, which could be delivered from the air, a surface vessel, or a submarine. This paper reviews the development of torpedoes in the past century since the first one was made in 1864. Structures of post World War II torpedoes are described. In the future, judging from the researches being carried out in various countries, it is possible that there will be rocket torpedoes, automatic floating missiles, and nuclear powered torpedoes, and these shall be automatically controlled by computers to seek out targets and to resist interference. They will also be high speed, low cost, and easy to maintain and repair.

AUTHOR: None

ORG: Simulation Group, Institute of Atmospheric Physics, Chinese Academy of Sciences

TITLE: "Atmospheric Circulation Simulation Experiment"

SOURCE: Peking K'O-HSUEH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3, Mar 78 pp 28-29, 32

ABSTRACT: Mainly there are three forces influencing atmospheric circulation: they are buoyancy, turbo-viscosity, and the earth's rotational deviation. In simulation experiments, the proportion between buoyancy and rotational deviation is represented by Rot number, and the proportion between rotational deviation and viscosity is represented by  $T^*$ . The key laboratory equipment remains to be a stably rotating platform to simulate the rotating earth. A photo of the equipment used by the authors in the experiment to simulate atmospheric circulation is included with the explanation. There is also a photo of the simulated upper layer current field of the Ch'ing-hai-Tibetan Plateau and another of subtropical high pressure simulation of the Western Pacific. These simulation experiments have broad applications. For example, it may be used to predict the effects of transferring the excess water from South China to North China on the weather or to formulate a 'weather calendar' for the future.

AUTHOR: MIAO Tao-jen [5379 6670 0088]

ORG: Lin-fen District Bureau of Forestry, Shansi Province

TITLE: "Ch'ih-kuo Oil Tree--A New Vegetable Oil Producing Tree"

SOURCE: Peking K'O-HSUEH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3, Mar 78 pp 34-35

ABSTRACT: This newly discovered oil producing tree is distributed in natural secondary forests in Hsiang-ning County of the southern end of Lu-liang-shan Mountains and I-ch'eng County of the northern part of Chung-t'iao-shan Mountains in Shansi Province. It has been identified by Professor CHENG Wan-chun [6774 8001 6874] to be a deciduous tree of the Elaeagnaceae Family. In early spring, its flowers are a good source of honey; its leaves are suitable as animal feed; its shelled nut has a fifty-one percent oil content. The local people call it by many different names; it is now officially called Ch'ih-kuo Oil tree. Its morphological characteristics are described. The chemical contents of its oil are compared with sesame oil, peanut oil, soybean oil, walnut oil, and rape oil. In the past several years, it has been successfully introduced to other areas. In its native Hsiang-ning County, the several hundred mu of artificially cultivated seedlings have basically grown into a forest.

AUTHOR: CHANG Meng-pen [1728 5492 2609]

ORG: None

TITLE: "Diatoms and Diatomaceous Earth"

SOURCE: Peking K'O-HSUEH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3, Mar 78 pp 39-40

ABSTRACT: Diatomaceous earth is a loose stone composed mainly of fossilized cell walls of diatoms. There are about 190 genera and 5500 species of diatoms. Of these 60-70 genera have become extinct. Someone analyzed the Tertiary diatomaceous earth of Lin-chu, Shantung Province and discovered that seventy-five percent of the diatoms belonged to the existing fresh water diatoms of tropical or subtropical zones. This information confirms the results of plant fossil studies of the region. We can surmise that this region was most likely a fresh water lake about two million years ago and the weather at that time should be much warmer. A study of the diatomaceous earth contributes to an understanding of ancient climate and environment and this understanding is extremely important in mineral prospecting. Many uses of diatomaceous earth, as refractory materials, in chemical fertilizer industries, etc. are also briefly explained.

AUTHOR: None

ORG: None

TITLE: "Standing Style Turbo Molecular Pump (Brief Explanation of Photo on Back Cover)"

SOURCE: Peking K'O-HSUEH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3, Mar 78 p 40, back cover

ABSTRACT: The turbo molecular pump, a photo of which is used as the back cover of this issue of the journal, has been successfully made by the Scientific Instrument Plant of Chinese Academy of Sciences. Most recently, it has been certified by the related departments to have reached the advanced level of similar products made in foreign countries. A turbo molecular pump is an ultra-vacuum device. The clean vacuum system this device produces is not polluted by oil steam, etc. and is not interfered with by strong magnetic or electric fields. Due to its superior properties, it will soon be extensively used in high energy accelerators, controlled thermonuclear reactors, pumping air from large electron tubes, purifying semi-conductors, vacuum metallurgy and refining, and other scientific instrumentation.

AUTHOR: None

ORG: None

TITLE: "New Fruits of the Science and Technology Battle Front"

SOURCE: Peking K'O-HSUEH SHIH-YEN [SCIENTIFIC EXPERIMENT] in Chinese No 3,  
Mar 78 inside front cover

ABSTRACT: Six photos are presented on the inside front cover: (1) A new tobacco slice-making machine produced by Tsingtao Cigarette Plant can turn waste tobacco into thin slices to produce 5800 cases of cigarettes above the yearly production of 400,000 cases from the same amount of tobacco. (2) A super-pure boron nitride tablet made by the Academy of Construction Materials to provide a new material for large scale development of composite circuits in China. (3) First rodent and locust poison bait spreader for pastures successfully made by the Institute of Pastoral Machinery of Hsi-lin-ku-le League of Inner Mongolia Autonomous Region. (4) A new plasma numerical display tube recently made by An-yang Electronic Tube Plant of Honan Province. (5) China's first transistor supersonic cross-section display instrument made by the Second Military University Hospital of Chinese People's Liberation Army. (5) A water desalinizing machine using the reverse percolation technique has been successfully made by the Bitter Water Desalinization Group of Lan-chou Institute of Glaciers and Permafrost, Chinese Academy of Sciences. Aside from desalinization of salt water, it may also be used to isolate or concentrate certain industrial products.

6168

CSO: 4009

SCIENCE PICTORIAL

AUTHOR: SHIH Ying-hsien [0670 3467 0103]

ORG: Cytology Department, Zoology Institute, Chinese Academy of Sciences

TITLE: "The Experiments of T'UNG Ti-chou and NIU Man-chiang"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 4,  
Apr '78 pp 1-2, 48

ABSTRACT: The article describes the collaborative research undertaken in China by Chinese biologist T'UNG Ti-chou 4547 4574 0719 and American biologist NIU Man-chiang 3662 3341 3068 in 1973. Working at the Zoology Institute of the Chinese Academy of Sciences, T'UNG and NIU removed DNA from the nuclei of the spermatozoa of bream and introduced it into fertilized ova of goldfish, producing fin characteristics of bream in 25.9% of the goldfish. They then isolated messenger DNA from mature ova of bream and injected it into fertilized ova of goldfish, with the result that about 33% of the goldfish had fin characteristics of bream. In this way they demonstrated that messenger DNA isolated from cytoplasm can affect hereditary characteristics. In another experiment, they demonstrated that messenger DNA could also bring about changes in internal as well as external structure. The significance of this work for agricultural science and medicine is discussed. Article includes photograph of T'UNG and NIU at work in T'UNG's laboratory.

AUTHOR: None

ORG: Underwater Welding Group, Harbin Welding Institute

TITLE: "When Welding is Carried Out Under Water"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 4,  
Apr '78 p 8

ABSTRACT: Article indicates the importance of underwater welding in making structures for offshore oil drilling and discusses three methods of underwater welding used in China and other countries. The first of these is rod arc welding, one of the first types to be used. It has the drawback of producing hard and brittle welds. The second is the dry welding method, in which the welding is carried out in a chamber from which the water has been pumped out. Its primary drawback is its high cost. The third is localized water drainage welding, in which the welder remains in the water but the welding is done in a small transparent chamber. Drawings are used to illustrate these methods.

AUTHOR: SHAO Ya-pao [6730 0068 1405]

ORG: None

TITLE: "Digital Communication"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 4,  
Apr 78 p 9

ABSTRACT: Article describes how information can be transmitted by a binary number system as well as how continuous information can be transmitted by numerical means. The components of a digital communications system and their functions are briefly outlined. The advantages of digital communications systems are discussed, including their adaptability for transmitting written documents, sound and pictures, the fact that they can be connected directly to computers and the fact that they have strong resistance to interference. The author anticipates a rapid development of digital communications systems as the use of computers becomes more widespread.

AUTHOR: SHAO Ya-pao [6730 0068 1405]

ORG: None

TITLE: "Modern Communications in Illustration"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 4,  
Apr 78 pp 10-11

ABSTRACT: Author discusses modern means of electrical and electronic communication. Among the types of such communications discussed in some detail are microwave relay communications, scattering communications, which utilize the action of dielectrics in the atmosphere in scattering electromagnetic waves for the purposes of communication, and satellite communications. Each of these methods is illustrated by one figure each. The article also includes illustrations of persons operating various types of electronic communications equipment, including telegraphic equipment, writing-telephone equipment, televised telephone communications equipment, facsimile equipment and computer communications equipment.

AUTHOR: TZU Ying [1311 5391]  
MIAO Pao [5379 5383]

ORG: None

TITLE: "Amazing Photographic Speed"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 4,  
Apr '78 pp 12-13

ABSTRACT: The authors discuss high-speed photography, describing photoelectric shutters with which it is possible to shoot  $10^{-8}$  or  $10^{-9}$  frames per second, and electronic shutters, with which it is possible to shoot  $10^{-12}$  to  $10^{-14}$  frames per second. Equipment for high-speed photography in outer space and for transmission of negative images from outer space. There are seven figures illustrating the equipment and processes involved.

AUTHOR: CHU Wei [2612 0251]

ORG: None

TITLE: "The Riddle of the Vacuum"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 4,  
Apr '78 pp 14-15

ABSTRACT: Author traces the evolution of concepts of space from the "ether" theory through Einstein's special theory of relativity to the view that a vacuum is filled with negatively charged electrons and also contains positively charged "electrons," or positrons. The author then discusses vacuum polarization and lack of symmetry affecting mesons. Author concludes that vacuums are complex, citing the possibility that the internal and external vacuums of basic particles differ from each other and that there may be a specific type of vacuum within the atomic nucleus. Author states that if this is the case, atomic nuclei of extremely high density may exist in the universe. Article includes 7 figures, one of which is a photograph of a positron path, and one additional photograph.

AUTHOR: CHUNG Shan [6945 1472]

ORG: None

TITLE: "An Ingenious Technique Under a Formless Lamp -- A Discussion of Kidney Transplantation"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 4, Apr 78 pp 16-17

ABSTRACT: The article begins with a description of a successful kidney transplantation operation conducted under acupuncture anesthesia in the Department of Surgery of the Chung Shan Hospital of Shanghai First Medical College. It was the first kidney transplantation operation performed in that hospital. The author then goes on to a discussion of kidney transplantation and immunological causes for the rejection of transplanted kidneys. The author indicates that the combined use of traditional Chinese and Western medical techniques is useful in solving the problem of tissue rejection. Basing their treatment on the traditional Chinese medical principle of "extravasation of blood," Chinese physicians have used preparations of such herbs as Scutellaria indica, peach kernels and Carthamus tinctorius for treatment when signs of rejection have appeared.

AUTHOR: None

ORG: None

TITLE: "Space War"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 4, Apr 78 pp 44-45

ABSTRACT: Article states that there are over 1000 satellites of various nations circling the earth and that the next war may begin in space. The article then goes on to describe various types of satellites that can be used in warfare, including "bomb" satellites, "mine" satellites, anti-satellite missiles, laser satellites and "kidnap" satellites, a type on which research is now going on by means of which the enemy satellite would be captured physically by the satellite. Various potential strategies of anti-satellite war are discussed. The article is illustrated with drawings depicting various types of satellite weapons.

AUTHOR: None

ORG: None

TITLE: "Brief Scientific and Technological Reports (1)"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL.] in Chinese No 4,  
Apr 78 pp 26-27

ABSTRACT: China Develops Equipment for Receiving Weather Satellite Cloud Pictures: The equipment was developed by research workers of the Atmospheric Physics Institute of the Chinese Academy of Sciences, the Ta-Ch'iao Machine Plant in Nanking and the Shanghai Wire Telephone Plant. Picture quality was said to be at an advanced level. New Technique for Artificial Synthesis of Rubber: Research workers under the guidance of the Ministry of Fuel and Chemical Industry have succeeded in developing a new technique for producing cis-butyl rubber using gasoline as the polymerization solvent. The rubber produced was said to be of high quality. Dynamic Electronic Railway Weighing Scale: A 100-ton capacity electronic railway weighing scale was developed by the cooperative efforts of the Wuhan Scales Plant, the Hupeh Chemical Industry Designing Institute and the Ta Yeh Steel Plant. The device converts the pressure due to the weight of the railway cars to electric signals which are converted to display numerical values. High Strength Gypsum: A high strength

[continuation of K'O-HSUEH HUA-PAO No 4, Apr 78 pp 26-27]

gypsum has been developed by the Construction Materials Institute in the Hui Autonomous District of Ningsia. The gypsum is reported to be light, strong, shock-resistant, simple to produce and cheap. Success on Experiments on Computer-Assisted Automatic Telephone Number Search: The device was developed by personnel of the Shanghai Municipal Telephone Exchange working in cooperation with the Shanghai Computer Technology Institute. The process requires on a few seconds and 320 callers can be serviced at the same time. Gas-Sensitive Semiconductor Element: The Harbin T'ung Chiang Transistor Plant has developed a type N MQ gas-sensitive semiconductor element made of metallic oxide semiconductor materials. It operates on the basis of molecular absorption. When it comes into contact with a combustible gas, a surface chemical reaction occurs that results in an increase in the conductance ratio. The gas concentration is converted to electric signals. New Type of Ceramic Ornamentation Technique - Internal Glaze Ornamentation: The technique uses a quick baking new raw material which is introduced into the glaze at high temperatures. The product has high resistance to abrasion and corrosion.

AUTHOR: None

ORG: None

TITLE: "Brief Scientific and Technological Reports (2)"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 4,  
Apr 78 pp 28-29

ABSTRACT: 500 Millimeter Full-Field Camera: The camera was developed at the Shanghai Instrument and School Supplies Plant. It can revolve about a full 360 degrees and has a film width of 250 mm. It can be used to photograph large groups. High-Frequency Differential Approach Switch: A new type of transistor approach switch, the WK-I high-frequency differential approach switch, has been trial-produced by the Shanghai Chen Ju Plastics Products Plant. It has been found to be superior to ordinary amplitude varying switches in several aspects. Operating distance is 10-35 mm and operating frequency is 90 times per second. A Strange Apparatus - The Horizontal Rolling Massage Apparatus: The device was developed at the First Machine Repair Plant of the Shanghai Machine Equipment Plant in cooperation with physicians of the Shanghai Yueh Yang Hospital. The rate and pressure of massage can be varied. Using Fluorine and Oil to Detect Leaks in Semiconductor Elements: This technique is considered superior to other methods because of its sensitivity and because of its chemical stability

[continuation of K'O-HSUEH HUA-PAO No 4, Apr 78 pp 28-29]

as well as the facts that it does not damage the equipment, results in few false images and facilitates observation. Anaerobic Sealing and Binding Agents: Anaerobic sealing and binding agents known as T'ieh Mao (Anchor) 300# and T'ieh Mao 350# have been developed by the cooperative efforts of units of the Shanghai Hsing Kuang Chemical Plant and Shanghai Science and Technology University. It has excellent properties and can be used in aircraft, automobiles, tractors and other equipment. Glass Fiber Wall Cloth: The Shanghai Yao Hua Glass Plant has succeeded in trial production of a glass fiber wall cloth that can be used in place of plaster and oil-based paints. It is attractive and durable and does not give off gas when burned. Successful Trial Production of Calendar Wristwatch: The watch, a Tsuan Shih (Diamond) brand calendar wristwatch, was produced by the Shanghai Fourth Watch Plant (photo-accompanies article). New Light Calcium Silicate Material: Most recently, personnel of the Shanghai Architectural Science Institute succeeded in the trial production of this new product. It consists primarily of silicon oxide and calcium oxide and is light with good properties of fire- and heat-resistance. It can be used as a furnace material for high temperature work in the petroleum chemistry industry and in materials for construction of buildings and ships. A Color-Filtering Glass Through Which Ultraviolet Rays Can Pass:

[continuation of K'O-HSUEH HUA PAO No 4, Apr 78 pp 28-29]

The Shanghai Glass Plant has succeeded in the trial production of this type of glass and it is thought that it will be important in the development of ultraviolet ray analysis instruments in China.

10,019

CSO: 4009

ACTA ZOOLOGICA SINICA

AUTHOR: CHIANG Chen-yu [3068 2182 5940]  
YEH Ch'iang [5509 1730]  
SHEN Yu-t'ang [3088 1635 2768]  
CHU Feng-hsien [2612 7364 0103]  
T'ANG Sheng-ch'in [3282 4141 2953]  
LIANG Ning-chien [2733 1380 1696]  
TSENG Hsing-ch'u [2582 1840 0443]

ORG: CHIANG of the Shanghai Institute of Physiology, Academia Sinica; YEH, SHEN, CHU all of the Shu Kuang Hospital, Shanghai College of Chinese Medicine; T'ANG, LIANG, TSENG all of the Department of Psychology, Shanghai Teachers University

TITLE: "Effects of Naloxone on Experimental Acupuncture Analgesia Evaluated by Sensory Decision Theory"\*

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese No 1, Mar 78 pp 1-10

EXCERPTS FROM ENGLISH ABSTRACT: Experiments were made on young medical volunteers in the summer of 1976. Each of them participated in several experiments on different days. Changes of pain perception were detected by two different methods: (1) Percutaneous electrical stimulation: The stimulus was a train of square pulses

[continuation of TUNG-WU HSUEH-PAO No 1, Mar 78 pp 1-10]

delivered on the volar surface of the left forearm. Four intensities were designated for each subject:  $0\tau$ ,  $0.85\tau$ ,  $1\tau$  and  $1.15\tau$ . One  $\tau$  was defined as the minimum current capable of eliciting faint pain and its average value for all subjects was  $279 \pm 25 \mu A$  (mean  $\pm$  S.E.). Before the experimental session, subjects were instructed to assign each stimulus experienced to one of the four categories: nothing, touch, faint pain and pain. During each session 100 stimuli of the four intensity levels were delivered sequentially in random order. Data gathered were analysed by the sensory decision theory. (2) Radiant heat test: Another area close to the former one was selected to be illuminated by an intense focalized light. The response time was taken as the pain threshold.

From the experimental data it could be inferred:

1. The moderate changes of  $d'$  during needling might indicate that the weak analgesic effect of acupuncture does have its physiological basis, though it also has somewhat the psychological implications indicated by the simultaneous increase in  $C$ .
2. Naloxone itself has no marked influence on pain perception in normal subjects, but it could partially reverse the acupuncture analgesia. This experimental fact indicates that the mechanism of acupuncture analgesia would be at least partially correlated with the activation of endogenous morphine-like substances induced by needling.

[continuation of TUNG-WU HSUEH-PAO No 1, Mar 78 pp 1-10]

Addendum: An article reported by Mayer, D.J. et al. has recently been published in BRAIN RESEARCH, 121 (1977) 368. Their results are quite in agreement with those of the present study.

\* Aid in this work was received from HSU Shih-chin [6079 0013 3866] of the Clinical Statistics Teaching and Research Group, Shanghai Hospital No 1, I Ch'ing-ch'eng [2496 1987 2052] of the Shanghai Institute of Materia Medica, and YANG Jen-te [2799 0088 1795] of the Mathematics Teaching and Research Group, Department of Pharmacology, Shanghai Academy of Chinese Medicine.

AUTHOR: TU Huan-chi [2629 3562 1015]  
SHEN O [3088 6948]  
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FU Lai-wen [0265 6336 2429]  
CHIN Kuo-chang [6855 0948 4545]  
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HAN I-fan [7281 1837 0416]  
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ORG: TU, SHEN, TUNG, CHIANG, MA, FU all of the Institute of Physiology, Shanghai;  
CHIN, CHANG, HAN, YU, FENG all of the Institute of Materia Medica, Shanghai\*

TITLE: "Effects on Acupuncture Analgesia by Injection of 5, 6-Dihydroxytryptamine in a Cat: A Neurophysiological, Neurochemical and Fluorescence Histochemical Study"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese No 1, Mar 78 pp 11-20

TEXT OF ENGLISH ABSTRACT: The viscerosomatic reflex, which could be inhibited by stimulation of the common peroneal nerve, was elicited by stimulation of the

[continuation of TUNG-WU HSUEH-PAO No 1, Mar 78 pp 11-20]

splanchnic nerve in the cat as an index of visceral pain reaction. Following lateral ventricle injection of 5,6-dihydroxytryptamine (5,6DHT), the inhibitory effect resulted from the common peroneal nerve stimulation (referred to as inhibitory effect of acupuncture, IEA) was observed. 5-hydroxytryptamine (5HT) and 5-hydroxyindoleacetic acid (5HIAA) content in different brain regions was examined, and the degeneration of the 5-hydroxytryptaminergic neurons in the medulla and spinal cord was demonstrated, using the Falck-Hillarp (1962) fluorescence histochemical technique.

1. In 3-4 days following the 5,6DHT injection (0.2-0.4 mg/kg), the IEA diminished to a large extent accompanying a significant decrease in 5HT and 5HIAA contents in the diencephalon, midbrain-pons, and in 5HIAA in the medulla.

2. In 8-10 days following the injection, the IEA remained to be at a low level, and lower 5HT and 5HIAA levels emerged in the diencephalon, midbrain-pons, medulla and spinal cord (T10-L2) regions.

3. Following ventricular or intracerebral (medullary raphe nuclei) injection of 5,6DHT, a progressive degeneration of 5HT nerve terminals occurred from cervical to sacral segments in the spinal cord. In 1-3 days, intense specific fluorescence was usually observed in the cell bodies and their proximate axons of 5HT neurons in the nucleus raphe magnus and nucleus raphe pallidus, suggesting an acute functional destruction of the neurons. The data are consistent with those of neurochemical examination.

4. After p-chloroamphetamine (5 mg/kg) administered intravenously or intraperitoneally, a sharp decrease in IEA could be found.

[continuation of TUNG-WU HSUEH-PAO No 1, Mar 78 pp 11-20]

The results are compatible with the idea that the normal function of the 5-hydroxytryptaminergic neurons in the raphe nuclei of the brain stem may be an important factor in the performance of acupuncture analgesia.

\* Comrade YANG Hsing-yu [7122 5281 3768] of the Kiangsi Medical Academy participated.

AUTHOR: WEI Jen-yu [7614 0088 2810]  
CHANG Shu-chieh [1728 3219 3381]  
FENG Chia-chen [7458 0857 4176]

ORG: All of the Shanghai Institute of Physiology, Academia Sinica

TITLE: "Activation of Unmyelinated Muscle Afferents By Acupuncture or Pressure Exerted on Muscle"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese No 1, Mar 78 pp 21-28

TEXT OF ENGLISH ABSTRACT: In our previous paper we reported the observation on the activity of pressure receptors with myelinated afferent fibers during acupuncture in the tibialis anterior muscle of a cat, and the topographical relationship of the distribution of their respective receptive fields with that of the acupuncture points. Our results suggested that the massive discharges from these receptors might be related to the formation of the "acupuncture sensation" and hence might play a role in producing the analgesic effect of acupuncture. In the present experiments we extend our observation to the activity of unmyelinated muscle afferents in the same preparation.

The experiments were performed on 15 adult cats anesthetized with nembotal (40 mg/kg, i.p.), paralyzed with Flaxedil, and artificially ventilated. By isolating the fine

[continuation of TUNG-WU HSUEH-PAO No 1, Mar 78 pp 21-28]

filaments from the nerve trunk in the popliteal fossa we identified 65 C units according to their low conduction velocity (less than 2.5 m/sec). A histogram was plotted to illustrate the frequency distribution of their conduction velocities in the total number of units observed.

Out of 65 units, 44 could be activated by strongly pressing the muscle with a glass probe but were not sensitive to muscle stretching. A few of them could be excited by light mechanical stimuli as well. Of these 44 C units, 18 responded with persistent discharges, 3 units with a short burst of discharges and the rest with only a few isolated spikes. With 11 of the 44 C units responding to acupunctural manipulation, we have found that the responses consisted of high frequency discharges in 5, a short burst in 2 and only a few spikes in 4. In about a quarter of the 44 units manual needling or heavy pressure exerted on the muscle repeatedly was followed by persistent irregular low frequency discharges lasting for many minutes or even hours. Such prolonged after-discharges might be related to the clinical phenomena of "after-feeling" and various other after-effects of acupuncture.

AUTHOR: None

ORG: The Acupuncture Anesthesia Research Group, Kuangsi Medical College, Nanning

TITLE: "The Action of the Nucleus Raphe Magnus and Nearby Structures in Acupuncture Analgesia"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese No 1, Mar 78 pp 29-40

TEXT OF ENGLISH ABSTRACT: We had previously reported that the unit discharges of the midbrain nociceptive neurons elicited by the peripheral noxious stimulation were inhibited during acupuncture. In decerebrated animals the inhibitory effect of acupuncture still persevered. In order to identify which structures in the brain stem might be involved in this effect, the action of the nucleus raphe magnus (n. Ra. mg) and the nearby structures has been studied on unanesthetized, immobilized rabbits. The unit discharges of the midbrain nociceptive neurons were recorded with microelectrodes and their responses to the peripheral stimulation were used as an indicator of the pain reaction. It was found that in more than one half of the nociceptive neurons in the midbrain the unit discharges could be affected by the stimulation of the n. Ra. mg and the nucleus reticularis gigantocellularis (n. Rgc). The types of the responses were very similar to those of the peripheral noxious stimulation. During acupuncture, or after the application of Dolantin intravenously, the responses elicited by the stimulation of the n. Ra. mg and the n. Rgc could be

[continuation of TUNG-WU HSUEH-PAO No 1, Mar 78 pp 29-40]

inhibited. When the noxious stimulation and the stimulation of the n. Ra. mg had been applied simultaneously or with a delay within 50 msec, the response of noxious stimulation was weakened in most cases, but in rare cases a facilitating effect could also be observed. The inhibitory effect of the acupuncture on the noxious stimulation could be enhanced when the stimulation of the n. Ra. mg was applied simultaneously. Lesion of the n. Ra. mg resulted in a decrease of the inhibitory effect during acupuncture and a disappearance of the inhibitory effect of Dolantin. A significant decrease or complete disappearance of the inhibitory effect of acupuncture could be observed when the lesion was made in the n. Ra. mg together with nearby structures (the medial part of the n. Rgc). It seemed that the n. Ra. mg might be involved in the ascending pathway of the pain. It was suggested that the n. Ra. mg and nearby structures might play an important role in the descending inhibitory influence on the pain reaction during acupuncture.

AUTHOR: None

ORG: The Acupuncture Anesthesia Research Group, Kuangsi Medical College, Nanning

TITLE: "Preliminary Studies on the Action of Midbrain Reticular Formation in Acupuncture Analgesia and Its Afferent Pathways"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese No 1, Mar 78 pp 41-57

TEXT OF ENGLISH ABSTRACT: We had previously reported that the inhibitory effect of acupuncture on blood pressure reaction still persisted in decerebrated animals. Stimulation in the midbrain reticular formation through a pair of implanted electrodes could suppress the pain reaction of the rabbits and affected the inhibitory effect of acupuncture. In order to study the action of midbrain reticular formation in acupuncture analgesia, the changes of the unit activities of the midbrain reticular neurons to noxious stimulation have been recorded in 82 rabbits with microelectrodes. Three types of responses could be elicited by noxious stimulation applied to intact and decerebrate (a complete transection made at the upper margin of the superior colliculi) animals: (1) Excitatory response. The rate of the unit discharges increased during noxious stimulation. (2) Inhibitory response. The unit discharges reduced or ceased. (3) Diphasic response. In a few neurons, in response to the noxious stimulation, the unit discharges increased at first and were followed by a decrement. In rare cases, there was a decrease of the discharges at first, followed

[continuation of TUNG-WU HSUEH-PAO No 1, Mar 78 pp 41-57]

by an increment. These responses could be abolished by the Dolantin intravenously. The nociceptive neurons were distributed diffusely in the midbrain. During electroacupuncture, all three types of the nociceptive responses gradually decreased or ceased with 10-15 minutes. Following cessation of the acupuncture, the responses continued to be completely or partially inhibited for several minutes. There was no significant difference between the intact and the decerebrate animals in the analgesic effect of the acupuncture. In order to analyse the afferent pathways of the acupuncture effect, we divided the brain stem into three parts at the level of the lower margin of the tuberculum acusticum and cuts were made in these regions bilaterally. It was found that after section of one or two regions, the nociceptive responses and the inhibitory effect of acupuncture still persisted. It seemed that there might be multiple paths existing in the brain stem in conveying the afferent nociceptive and acupuncture informations to the midbrain reticular neurons. It was suggested that the midbrain reticular formation might play an important role in the acupuncture anesthesia.

AUTHOR: None

ORG: Department of Physiology, Hopeh College of New Medicine, Shih-chia-chuang

TITLE: "An Analysis of Receptors and Afferent Fibers of Acupuncture Points of NEIDUAN, HOKU and TSUSANLI in Human Subjects"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese No 1, Mar 78 pp 58-64

TEXT OF ENGLISH ABSTRACT: The tungsten microelectrode (tip diameter of 3-5 $\mu$ ) insulated with PEP fluorinated plastic 46 was inserted manually through skin, subcutaneous tissue and nerve sheath to record single-unit activity from intact peripheral nerves of awake human subjects. By the conventional electrophysiological method, afferent activity was recorded from the following nerves: the median nerve about 7.0 cm proximal to the elbow or 3.0 cm proximal to the wrist, the ulnar nerve about 3.0 cm proximal to the wrist, and the common peroneal nerve at the knee jerk level.

When inserting the tungsten microelectrode into the nerve, the subjects usually experienced paresthesia within some restricted areas of hand or foot. The paresthesia lasted only a few seconds. On needling of NEIKUAN and TSUSANLI points by hand maneuver, the evoked afferent impulses could be consistently recorded from the median nerve and common peroneal nerve respectively, while needling of HOKU point in the

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same way could evoke the afferent discharge either in the median nerve or in the ulnar nerve. Concomitantly, the needling sensation of soreness, distension and heaviness was perceived by subjects within the areas innervated by corresponding nerves. The intensity of the needling sensation was essentially proportional to the rate of afferent discharge. Furthermore, it was possible to identify the type of receptor in the acupuncture points by various kinds of peripheral stimuli required to induce afferent responses. In general, the pressure and stretch receptors located in deep tissues within the areas of NEIKUAN, HOKU and TSUSANLI were able to be excited by needling. The afferent fibers by which the needling sensation was conveyed might be classified according to the indirect method previously described by Lloyd and Chang (1948). The afferent fibers of groups II and III coming from HOKU and NEIKUAN points seemed to be responsible for initiation of the needling sensation, while those from TSUSANLI point could not be identified for the technical reason. On the basis of results obtained, it seems likely that by needling the NEIKUAN, HOKU and TSUSANLI points a mixed sensation could be induced, being transmitted via afferent fibers of groups II and III from the deeper structures.

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TITLE: "An Animal Model for the Study of the Mechanism of Acupuncture Analgesia Under Waking Conditions"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese No 1, Mar 78 pp 65-70

TEXT OF ENGLISH ABSTRACT: Rats without anesthesia were stung subcutaneously in the tail region with a train of rectangular impulses. The sign of pain was indicated by screaming. By testing the pain effect consistently, a comparatively stable pain threshold had been established within 2 hours. After inducing analgesia with an electrical needling at the root of both ears of the rats, a significant increase in the pain threshold was observed. The analgesic effect of the electrical needling is reproducible at any chosen time.

The model is considered to be reliable and could be used for further studies on the mechanism of acupuncture analgesia. Some factors which may influence the pain threshold are discussed.

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TITLE: "Studies on the Relationship Between Adrenal Corticosteroids and Acupuncture Analgesia. I. Effect of Glucocorticosteroids in Rats"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese No 1, Mar 78 pp 71-80

TEXT OF ENGLISH ABSTRACT: An animal model of acupuncture analgesia was devised using conscious albino rats to investigate the relationship between corticosteroids and acupuncture analgesia. Experiments showed that:

1. The plasma corticosterone rose markedly after the rats were placed in the fixing cases and the tail was stimulated mechanically, but the rat's pain threshold was not effected by such stress.
2. Exogenous glucocorticosteroid (hydrocortisone and corticosterone) had no effect upon the pain threshold and acupuncture analgesia.
3. No difference in pain threshold and acupuncture analgesia effect was noticed before and after bilateral adrenalectomy in the absence of corticosteroid supplement, although their plasma corticosterone had dropped to a very low level.
4. No difference in pain threshold and acupuncture analgesic effect was observed

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before and after dexamethasone treatments.

From the above experiments, it is suggested that corticosteroid, especially glucocorticosteroids, may not play a role in the mediation of acupuncture analgesia and therefore the acupuncture analgesia is not a simple process of stress. It is evident that acupuncture analgesia and stress are two different physiological phenomena.

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TITLE: "Studies on the Relationship Between Adrenal Corticosteroids and Acupuncture Analgesia. II. Clinical Study of Glucocorticosteroids"

SOURCE: Peking TUNG-WU HSUEH-PAD [ACTA ZOOLOGICA SINICA] in Chinese No 1, Mar 78 pp 81-84

TEXT OF ENGLISH ABSTRACT: Experiments which have been carried out during clinical surgery under acupuncture anesthesia consist of: 1) determination of plasma endogenous corticosteroid level at various intervals before and after the operation; 2) effect of exogenous glucocorticosteroid on the performance of acupuncture anesthesia. The results showed that when acupuncture was given to the patients who had a high level of plasma corticosteroid, no further increase in hormone was noticed. On the other hand, corticosteroid was profoundly elevated following surgery trauma, yet the changes were not correlated with the outcome of acupuncture anesthesia. Neither would the administration of hydrocortisone have improved the effect of acupuncture anesthesia. It is suggested that adrenal corticosteroids,

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especially glucocorticosteroid, do not participate in clinical acupuncture anesthesia or acupuncture analgesia, and this is consistent with the results of animal experiments.

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TITLE: "Studies on the Relationship Between Adrenal Corticosteroids and Acupuncture Analgesia. III. Effect of Mineralocorticosteroid in Rats"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese No 1, Mar 78 pp 85-87

TEXT OF ENGLISH ABSTRACT: The effect of desoxycorticosterone sodium succinate (DOC) upon acupuncture analgesia was studied in conscious albino rats. Experiments showed that the administration of DOC could tranquilize and markedly raise the rat's pain threshold. It also enhanced the effect of acupuncture analgesia. Due to the fact that the effect dosage used was extremely high and bilateral adrenalectomy did not influence the performance, it is suggested that the effect of DOC upon acupuncture analgesia is probably not a physiological phenomenon, but rather a pharmacological effect.

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TITLE: "Some Trematodes Belonging to the Genus Tanaisia Skrjabin (Family Eucotylidae) From Birds in Yunnan, China"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese No 1, Mar 78 pp 88-90

TEXT OF ENGLISH ABSTRACT: In a survey of the trematodes belonging to the genus Tanaisia (family Eucotylidae), seven species of birds were examined from Yunnan Province, China. Five species of trematodes were found, among which one is considered as new to science, I. yunnanensis. Three are new records for China, namely I. bragai Santos, 1934; I. gratiosa Nezlobinski, 1926; I. fedtschenkoi Skrjabin, 1924. All of the seven species of birds examined are found to be new host records.

Tanaisia yunnanensis sp. nov.

This species closely resembles I. oviapera Freitas, 1951, but differs distinctly

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from the latter as follows: (1) body broader; (2) oral sucker smaller, 0.179-0.236 x 0.288-0.361 mm; (3) esophagus swollen frequently; (4) with a deeply lobed ovary; (5) posterior end of the vitellaria far apart from the body end; (6) egg smaller, 0.022-0.033 x 0.008-0.016 mm; (7) parasite of Galliformes.

Host: Gallus gallus spadiceus (Bonnaterre).

Location: Kidney.

Distribution: Yunnan Province, China.

Date: March to May, 1965.

Type and paratypes: Deposited in the Institute of Zoology, Academia Sinica.

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TITLE: "Studies on Trematodes of the Family Cyclocoelidae of Fukien with Further Remarks on the Life History and Epidemiology of Tracheophilus cymbius (Dies., 1850) Skrjabin, 1913"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese No 1, Mar 78 pp 91-101

EXCERPTS FROM ENGLISH ABSTRACT: A survey on helminth parasites of domestic ducks and wild aquatic birds from Foochow was conducted during the winter of 1964. All together 121 ducks and 425 aquatic birds were examined. Among other helminths, 193 specimens of cyclocoelid trematodes belonging to seven species, five genera and two subfamilies were collected from 16 species of birds. There are 3 new distributional records and 11 new host records given in this paper. The cyclocoelid trematodes secured are as follows: Cyclocoelum mutabile (Zeder, 1800); Cyclocoelum microstomum (Creplin, 1820) Kossack, 1911; Haematotrephus triangularum (Harrah, 1922); Uvitellina adelpha (Johnston, 1916) wit., 1923; Uvitellina kerii Yamaguti, 1933; Ophthalmophaqus magalhaesi Travassos, 1925 and Tracheophilus cymbius (Dies., 1850) Skrjabin, 1913. While general accounts were given on all the above-mentioned

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species, special emphasis was laid on I. cymbius with regard to its epidemiology and life history.

Discussion is made of the systematics of the family Cyclocoelidae. It is considered that better taxonomic criteria for this group of trematodes probably lie on the relation of uterus, intestine and the locations of the gonads taken altogether. The relative position of gonads can be used alone, provided the ranges of their morphological variations are known. In the present study a system on Cyclocoelidae is proposed, consisting of two subfamilies and ten genera.

Based on the studies of the life cycle of I. cymbius, it is demonstrated that the Cyclocoelidae Kossack, 1911, is closely related to Philophthalmidae. The phylogeny of these families is discussed.

\* The present work was carried out under the guidance of prof. T'ANG Chung-chang [0781 0112 3864] and was aided by comrade CHOU Shu-lung [0719 6615 7893].

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