

JPRS 72098

24 October 1978

CHINA

PEOPLE'S REPUBLIC OF CHINA SCIENTIFIC ABSTRACTS  
No. 201

**DISTRIBUTION STATEMENT A**  
Approved for Public Release  
Distribution Unlimited

**Reproduced From  
Best Available Copy**

**U. S. JOINT PUBLICATIONS RESEARCH SERVICE**

20000412 141

#### NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

#### PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22151. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available through Bell & Howell, Old Mansfield Road, Wooster, Ohio, 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

<b>BIBLIOGRAPHIC DATA SHEET</b>		1. Report No. JPRS 72098	2.	3. Recipient's Accession No.	
4. Title and Subtitle PEOPLE'S REPUBLIC OF CHINA SCIENTIFIC ABSTRACTS, No. 201			5. Report Date 24 October 1978		
7. Author(s)			6.		
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201			8. Performing Organization Rept. No.		
			10. Project/Task/Work Unit No.		
			11. Contract/Grant No.		
12. Sponsoring Organization Name and Address  As above			13. Type of Report & Period Covered		
			14.		
15. Supplementary Notes					
16. Abstracts  The serial report contains abstracts in scientific disciplines regarding China.					
17. Key Words and Document Analysis. 17a. Descriptors					
China					
<input type="checkbox"/> Agricultural Science and Technology		<input checked="" type="checkbox"/> Engineering and Equipment			
<input checked="" type="checkbox"/> Bio-Medical Sciences		<input type="checkbox"/> Electronics and Electrical Engineering			
<input checked="" type="checkbox"/> Chemistry		<input checked="" type="checkbox"/> General Sciences			
<input type="checkbox"/> Cybernetics, Computers, and Automation Technology		<input checked="" type="checkbox"/> Materials Science and Metallurgy			
<input checked="" type="checkbox"/> Earth Sciences		<input checked="" type="checkbox"/> Physics and Mathematics			
17b. Identifiers/Open-Ended Terms					
17c. COSATI Field/Group 01, 02, 04, 06, 07, 08, 09, 11, 12, 13, 20					
18. Availability Statement Unlimited availability. Sold by NTIS Springfield, Va. 22151			19. Security Class (This Report) UNCLASSIFIED		21. No. of Pages 60
			20. Security Class (This Page) UNCLASSIFIED		22. Price

JPRS 72098

24 October 1978

## PEOPLE'S REPUBLIC OF CHINA SCIENTIFIC ABSTRACTS

No. 201

This serial publication contains abstracts of articles published in selected scientific and technical journals. JPRS is unable to honor requests for original source materials or information as to the availability of full translations of these articles.

CONTENTS	PAGE
CHIH-WU HSUEH-PAO [ACTA BOTANICA SINICA] No 2, June 1978 .....	1
CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] No 2, 1978 .....	11
LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] No 3, July 1978 .....	18
CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] No 1, 2, June 1977; and No 1, March 1978.....	25
K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] No 6, June 1978 .....	44
TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] No 2, June 1978 .....	52

ACTA BOTANICA SINICA

AUTHOR: TS'AI Ch'i-kuei [5591 6386 6311]  
CH' IEN Ying-ch'ien [6929 6601 0241]  
CHOU Yun-lo [0719 0061 5012]  
WU Su-hsuan [0702 4790 5503]

ORG: All of the Institute of Botany, Chinese Academy of Sciences

TITLE: "A Further Study on the Isolation and Culture of Rice (Oryza sativa L.) Protoplasts"

SOURCE: Peking CHIH-WU HSUEH-PAO [ACTA BOTANICA SINICA] in Chinese No 2, Jun 78 pp 97-102

TEXT OF ENGLISH ABSTRACT: The isolation technique, culture medium and cultural conditions of rice protoplasts were modified and a great amount of calli regenerated from individual protoplasts was obtained successfully. The main conditions which are necessary for obtaining reproducible results are discussed.

AUTHOR: LI Shu-chun [2621 3219 0193]  
TS'AI Chien-p'ing [5591 0494 5493]  
WANG Kuo-ch'iang [3769 0948 1730]  
WANG Mei-ch'i [3769 2734 3825]  
CHAO Hai-ying [6392 3189 5391]

ORG: All of the Laboratory of Photosynthesis, Shanghai Institute of Plant Physiology, Chinese Academy of Sciences

TITLE: "Studies on the Structure and Function of Chloroplasts. II. Isolation and Interchangeability of Pure Chloroplast Coupling Factors"

SOURCE: Peking CHIH-WU HSUEH-PAO [ACTA BOTANICA SINICA] in Chinese No 2, Jun 78 pp 103-107

TEXT OF ENGLISH ABSTRACT: In a previous report it was shown that the activity of coupling factors isolated from chloroplasts of other plant species was higher than that of those obtained from chloroplasts of the same species for restoring the cyclic photophosphorylation activity of the deficient particles. However, the coupling factors then used were crude extracts or extracts after partial purification only. Verification of the results with purified preparation was highly desirable.

[continuation of CHIH-WU HSUEH-PAO No 2, Jun 78 pp 103-107]

To this end several methods of extraction and purification of chloroplast coupling factors were compared. It was found that the coupling factors extracted with dilute EDTA solution from the chloroplasts after the removal of heterogenous proteins showed a single band on polyacrylamide gel electrophoresis. When deficient particles from spinach chloroplasts were incubated with coupling factors purified in this way from broad bean (Vicia faba L.) or barley (Hordeum vulgare L.), the restored photophosphorylation activity was still higher than that incubated with coupling factors prepared from spinach chloroplasts and purified in the same way.

Thus it can be concluded that the enhancement effect of coupling factors from different species was due to the coupling factors per se and not to any substance(s) contaminated in the crude extracts.

AUTHOR: SHEN Ch'i-i [3088 0366 4135]  
YEN Lung-fei [7051 7127 7378]  
LI Ch'ing-chi [2621 1987 1015]  
CHANG Yuan-en [1728 0337 1869]  
T'ENG Hsiao-yueh [3326 2556 2588]  
LI Chun-i [2621 4596 1355]  
WANG Cheng-fen [3769 2973 5358]  
FU Ts'ui-chien [0265 5050 6297]

ORG: SHEN, YEN, LI, CHANG, T'ENG and LI all of the Department of Plant Protection and Department of Agronomy, North China University of Agriculture; WANG of the Institute of Plant Protection, Shensi Sheng Academy of Agriculture; FU of the Institute of Cotton, Chinese Academy of Agriculture and Forestry

TITLE: "Changes in Peroxidase Isozymes in Cotton Plants Infected by Fusarium oxysporum"

SOURCE: Peking CHIH-WU HSUEH-PAO [ACTA BOTANICA SINICA] in Chinese No 2, Jun 78 pp 108-113

EXCERPT FROM ENGLISH ABSTRACT: The changes in peroxidase isozymes of different varieties of cotton seedlings after inoculation by Fusarium oxysporum f. sp.

[continuation of CHIH-WU HSUEH-PAD No 2, Jun 78 pp 108-113]

vasinfectum was studied with polyacrylamide gel electrophoresis. After inoculation, the activities of peroxidase isozymes in cotyledons were intensified and new bands appeared. The enzyme activities of susceptible varieties (four varieties) were higher than those of the resistant ones (eight varieties). The susceptible varieties invariably had one or two more isozyme bands than the resistant ones. The changes in intensity of the peroxidase isozymes of cotton seedlings after infection are coincident with the appearance of morphological symptoms of the disease.

AUTHOR: YEH Chi-yu [5509 3444 1342]  
T'ANG Ch'ung-ch'in [0781 1504 2953]  
WANG Mei-ch'i [3769 5019 3825]  
HAN Ch'i [7281 3825]

ORG: All of the Laboratory of Photosynthesis, Shanghai Institute of Plant Physiology, Chinese Academy of Sciences

TITLE: "The Effect of Snake Venom on Intact Spinach Chloroplasts"

SOURCE: Peking CHIH-WU HSUEH-PAD [ACTA BOTANICA SINICA] in Chinese No 2, Jun 78 pp 114-121

TEXT OF ENGLISH ABSTRACT: Spinach chloroplasts treated by incubation with *Naja naja* venom, or with phospholipase A purified from it, lost their activity in the reduction of NADP, ferricyanide, MV and DCPIP and the concomitant evolution of  $O_2$ . But if benzoquinone or thymoquinone was added as electron acceptor,  $O_2$ -evolving capacity of such chloroplasts could still be shown. On the other hand, when DCPIP $H_2$  or TMPDH $_2$  was added as electron donor, NADP- or MV-reducing activity could be demonstrated. These results suggest that the site of inhibition of the Hill reaction by venom is located between Photosystem I and Photosystem II. Plastoquinone is probably the point of disjunction of the electron transport chain.

[continuation of CHIH-WU HSUEH-PAO No 2, Jun 78 pp 114-121]

The incubated chloroplasts were examined under electron microscope. It was found that the lamellar membranes of grana were swollen and disintegrated to varying extents depending on the duration of incubation.

AUTHOR: P'AN Ching-li [3382 2529 7787]  
KAO Kung-hung [7775 0361 3126]

ORG: Both of the Laboratory of Morphology and Cytology, Northwest Institute of Botany

TITLE: "The Production of Wheat Pollen Embryo and the Influence of Some Factors on Its Frequency of Induction"

SOURCE: Peking CHIH-WU HSUEH-PAO [ACTA BOTANICA SINICA] in Chinese No 2, Jun 78 pp 122-128

TEXT OF ENGLISH ABSTRACT: 1. The pollen plants developed directly from wheat pollen grains by two ways: (1) The uninucleate pollen divided many times and developed into mature pollen embryos, which then grew into plantlets; (2) The globular embryo grew further and formed irregular small callus, which in turn differentiated rapidly into plantlets on the same medium without any transplanting. 2. Of all basal mediums  $N_6$  medium is considered to be the best one. 3. If the spike of wheat is treated with the centrifuge at 2000 rev/min for 20 minutes before placing on the medium, the frequency of plantlets developed directly from pollen grains is greatly increased.



[continuation of CHIH-WU HSUEH-PAO No 2, Jun 78 pp 122-128]

4. The extraneous hormone was found to be beneficial to the embryogenesis of the wheat pollen embryos. The best result was obtained from the anthers cultured continuously at 7-10°C for 120 hours on medium to which was added 2:6 mg/l IAA and kinetin after inoculation. Under these conditions the frequency of induction increased to 6.2%.

\* YANG Chao-ch'ien [2799 0340 3383], WANG Chin-hsuan [3769 2516 6693] and TAN Hai [3225 3189] participated in portions of the study.

AUTHOR: CHANG Feng-hsien [1728 7364 0103]  
WANG Chu-hao [3769 6999 6275]  
P'AN Wen-tou [3382 2429 2435]  
LI Yu-ching [2621 3022 2417]  
MAI Leng-t'ien [7796 3186 1131]  
SUN Chien-ch'uan [1327 1696 3123]  
MA Kuang-en [7456 1684 1869]

ORG: CHANG, WANG, P'AN, LI, MAI and SUN all of the South China Institute of Botany, Chinese Academy of Sciences; MA of the Shanghai Institute of Materia Medica, Chinese Academy of Sciences

TITLE: "A Study on the Antitumor Plant Cephalotaxus oliveri Mast."

SOURCE: Peking CHIH-WU HSUEH-PAO [ACTA BOTANICA SINICA] in Chinese No 2, Jun 78 pp 129-134

TEXT OF ENGLISH ABSTRACT: Three alkaloids, harringtonine, cephalotaxine and schelhammera alkaloid B, were isolated from Cephalotaxus oliveri Mast. which is distributed in Kwangtung province. The inhibiting effect of harringtonine for sarcoma 180 in mice was 42.3% at a dosage of 1 mg/kg. It showed high activity against the acute nonlymphoblastic leukemia in clinical experiments. A pretty

[continuation of CHIH-WU HSUEH-PAO No 2, Jun 78 pp 129-134]

high yield of 1.3/10,000 antileukemic ingredient harringtonine was extracted from the plant and the resources of C. oliveri Mast. in China are abundant, so this plant is a good source of harringtonine.

AUTHOR: None

ORG: Laboratory of Resources, Tsinghai Provincial Institute of Biology;\* and Laboratory of Phytochemistry, Institute of Botany, Chinese Academy of Sciences

TITLE: "The Chemical Constituents of the Essential Oil of Rhododendron thymifolium Maxim."

SOURCE: Peking CHIH-WU HSUEH-PAO [ACTA BOTANICA SINICA] in Chinese No 2, Jun 78 pp 135-139

TEXT OF ENGLISH ABSTRACT: This paper presents the chemical constituents of the essential oil from the leaves of Rhododendron thymifolium. Ten components have been separated and identified, i.e. germacrene, juniper camphor, nonaldehyde, myrcene, limonene, humulene, camphene, farnesene,  $\alpha$ -pinene and  $\beta$ -pinene. Their contents have been determined also.

\* SHIH Chih-hsien [1597 1807 6343], YANG Hai-jung [2799 3189 2837] and I Fu-shen [0122 3940 3947].

AUTHOR: CHANG Hsin-shih [1728 2450 2514]

ORG: Department of Forestry, Sinkiang August-1 Agricultural College

TITLE: "The Plateau Zonality of Vegetation in Tibet"\*

SOURCE: Peking CHIH-WU HSUEH-PAO [ACTA BOTANICA SINICA] in Chinese No 2, Jun 78  
pp 140-149

TEXT OF ENGLISH ABSTRACT: 1. The vegetation of the Tibetan plateau is different from the general vegetation of "horizontal zones" and it is also different from that of "vertical zones" in mountainous country. It belongs to the vegetation of vertical zones of the "peneplain pattern." Therefore, it may be called the vegetation of "plateau zones."

2. The zonation of vegetation in Tibet changes from the southeast to the northwest as follows: forest—meadow—steppe—desert. The formation of these plateau zones is determined mainly by the elevating of the plateau to such a great extent that the particular regime of air circulation was obtained. The wet southwest monsoon is the fundamental factor for the development of the tropical and subtropical mountain forests in the southeastern part of Tibet. The plane of the plateau is under the control of the westerly wind circulation and "Tsinghai-Tibet" high pressure. Under the influence of such continental climatic conditions on

[continuation of CHIH-WU HSUEH-PAO No 2, Jun 78 pp 140-149]

the plateau, the high-cold meadow, steppe and desert vegetations are formed.

\* Also taking part were CHANG Ching-wei [1728 4842 3555], WANG Chin-t'ing [3769 6855 0080], CH'EN Wei-lieh [7115 0251 3525], LI Po-sheng [2621 3258 3932], WANG Shao-ch'ing [3769 4801 1987], LI Liang-ch'ien [2621 5328 0578] and LO Liu-sheng [5012 2692 0524], all of the Botany Institute, Chinese Academy of Sciences; and CHAO K'uei-i [6392 7608 5030] of the Kirin Geography Institute.

AUTHOR: None

ORG: Laboratory of Genetics, Wuhan University

TITLE: "Cytological Observations of Pollen Abortion of Male-Sterile Line 'Red-Awned Wild Rice x Lien-t'ang-tsao'"

SOURCE: Peking CHIH-WU HSUEH-PAO [ACTA BOTANICA SINICA] in Chinese No 2, Jun 78 pp 150-153

TEXT OF ENGLISH ABSTRACT: This is a study on the pollen abortion in five backcross generations of "Red-awned wild rice x Lien-t'ang-tsao." Various abnormalities were observed in the whole period of microsporogenesis. Pollen development was usually arrested before the binucleate stage, resulting in abortion of pollen grains finally.

Pollen abortion took place mainly at the late uninucleate stage. On the whole, various abnormalities in pollen abortion were found in all five backcross generations.

AUTHOR: None

ORG: Haploid Research Group, Vegetable Institute, Peking Academy of Agriculture

TITLE: "Observations on the Production of Pollen Plants and Their Progeny in Solanum melongena L. Var. Grossum"

SOURCE: Peking CHIH-WU HSUEH-PAO [ACTA BOTANICA SINICA] in Chinese No 2, Jun 78 pp 154-159

TEXT OF ENGLISH ABSTRACT: The pollen plants were successfully grown from the embryoids and calli induced from pollen in anther culture. By doubling chromosomes, more homozygous diploids were obtained. The effect of a laser on induction of the embryoid from the pollen was also studied and the preliminary effective measures of shoot formation from embryoid were made to decrease mixoploid phenomena. No reduction of the pollen plant in vitality from embryoid and callus has been detected.

AUTHOR: None

ORG: Research Group of Environment Protection Laboratory No 2, Institute of Botany, Chinese Academy of Sciences

TITLE: "The Effect of Arsenic Contained in Waste Water on Crop Plants"

SOURCE: Peking CHIH-WU HSUEH-PAO [ACTA BOTANICA SINICA] in Chinese No 2, Jun 78 pp 160-165

TEXT OF ENGLISH ABSTRACT: Crop plants irrigated with waste water containing low concentration (under 1 mg/l) of arsenic may grow and develop normally, and the arsenic contents accumulated in soils and crop plants are similar to those irrigated with clean water. As the concentration of arsenic rises to 5 and 20 mg/l, however, the yields of wheat and rice decrease respectively.

Arsenic accumulation in rice increases perceptibly with irrigated concentrations of 5 mg/l of arsenic. It is suggested that approximately 5 mg/l of arsenic may be the critical concentration for crop plants irrigated with waste water.

A certain amount of  $\text{FeSO}_4$  added to the soil may reduce the uptake of arsenic by rice.

AUTHOR: LIANG Yuan-hui [2733 0337 1798]  
LUNG Huo [7893 3172]  
LIANG Ch'i-fang [2733 3825 5364]

ORG: All of the South China Institute of Botany, Chinese Academy of Sciences

TITLE: "Notes on Pollen Morphology of the Plants from Paracel Islands"

SOURCE: Peking CHIH-WU HSUEH-PAO [ACTA BOTANICA SINICA] in Chinese No 2, Jun 78 pp 166-174

TEXT OF ENGLISH ABSTRACT: This paper presents pollen morphology of the plants from the Paracel Islands (China's islands in the South China Sea). Thirty-nine species in 37 genera belonging to 25 families are described and photomicrographically illustrated. These are: Sesuvium portulacastrum L., Alternanthera sessilis (L.) DC., Amaranthus viridis L., Celosia argentea L., Gomphrena celosioides Mart., Cordia subcordata Lam., Messerschmidia argentea (L.f.) Johnston, Cleome viscosa L., Casuarina equisetifolia L., Chenopodium acuminatum Willd. subsp. virgatum (Thunb.) Kitam., Terminalia catappa L., Conyza bonariensis (L.) Cronq., Iridax procumbens L., Vernonia patula (Dry.) Merr., Wedelia biflora (L.) DC., Ipomoea pes-caprae (L.) Sweet, I. tuba (Schlecht.) G. Don, Euphorbia atoto Forst. f., Scaevola sericea Vahl, Eragrostis ciliata (Roxb.) Nees,

[continuation of CHIH-WU HSUEH-PAO No 2, Jun 78 pp 166-174]

Calophyllum inophyllum L., Pemphis acidula J. S. & Forst., Mimosa pudica L.,  
Bogenhardia crispa (L.) Kearney, Sida parvifolia DC., Mollugo oppositifolia L.,  
Boerhavia diffusa L., B. erecta L., Pisonia grandis R. Br., Canavalia maritima  
(Aubl.) Thou., Crotalaria mucronata Desv., Guettarda speciosa L., Morinda  
citrifolia L., Solanum nigrum L. var. pauciflorum Liou, Suriana maritima L.,  
Lippia nodiflora (L.) Rich., Waltheria americana L., Clerodendron inerme (L.)  
Gaertn., Tribulus cistoides.

8650

CSO: 4009

JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE

AUTHOR: CH'EN Tzu-kuang [7115 1311 0342]

ORG: None

TITLE: "An Initial Theoretical Analysis of the Law of Timely Development of the  $\epsilon$  Type Tectonic System"

SOURCE: Chang-chun CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 78 pp 1-15

ABSTRACT: The author claims that Prof Li Szu-kuang [2621 0934 0342] formed his basic concept on "tectonic system" when he began to understand the  $\epsilon$  type structure. In this article, the author uses Boltzmann's integral equation to describe the law of timely development of the  $\epsilon$  type structure, and makes an initial analysis of its field of stress and field of strain. From the theoretical analysis, the author estimates that in China most such structures began to appear in the early Jurassic period and had basically taken shape in the last part of the same period, covering about 40 million years. In conclusion, he states that the occurrence, development and formation of these structures constituted a historical process, and that the time factor is, therefore, of extraordinary importance.

AUTHOR: YANG Chen-sheng [2799 2182 0581]  
LU Ching-wen [4151 2529 2429]  
P'AN Yun-tse [3382 7189 3419]

ORG: None

TITLE: "Initial Studies on the Old Structure of Devonian System in the Eastern Section of East Ch'in-ling Range"

SOURCE: Chang-chun CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 78 pp 15-24

ABSTRACT: Ch'in-ling is a mountain range on the northern border of Shensi Province in Northwest China. In this article, the authors try to use the theory and methodology of geomechanics and, by finding out the framework of the Devonian old structure of the eastern section of East Ch'in-ling Range, compile geological data for the discussion on the preliminary survey of iron deposits related with the Devonian Period. They use drawings to describe the major movements and the structural framework of the earth-crust in the Mesozoic era and Palaeozoic era of the period in this mountain area, and make an initial analysis of the old structure in the Devonian Period. Several graphic diagrams show the rock formation and earth layers of the area in the early and middle Devonian Periods.

AUTHOR: LAN Yu-ch'i [5695 3768 3823]  
CHANG I-hsia [1728 6318 0204]

ORG: None

TITLE: "The Repletion of Autochthonic Rock of the Metamorphic Formation Containing Iron in Ch'ien-an in Hopei Province"

SOURCE: Chang-chun CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 78 pp 24-34

ABSTRACT: Ch'ien-an is one of the important iron mining bases in North China. The repletion of autochthonic rock of metamorphic formation is a rather complicated work. This work has an important bearing on the determination of a set of the autochthonic formation of metamorphic rocks in the area concerned, thus to solve questions on the formation of rock mineral deposits, the position of ore layers and the law of distribution of these layers. The authors explain their petrofabric analysis of the metamorphic rock layers with graphic illustrations, and present a detailed table showing results of chemical analysis of more than 60 kinds of metamorphic rocks in Ch'ien-an area. Four diagrams are given to show the repletion of some major rock samples used in their chemical analysis. It is determined that the autochthonic rocks in Ch'ien-an area consist of "basic volcanic rocks mixed with moderately acid volcanic condensed ash rocks and clayey rocks as a formation of silicon and iron."

AUTHOR: FAN Kuo-ch'uan [5400 0948 0278]  
YANG Lien-sheng [2799 6647 3932]  
YANG Yu-po [2799 3768 3134]

ORG: None

TITLE: "A Study on the Co-Existence of Accompanying Elements in Silver-Lead-Zinc Deposits in Meng-en"

SOURCE: Chang-chun CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 78 pp 35-39

ABSTRACT: This article gives a short introduction to the state of co-existence of some principal accompanying elements in the mineral deposits and, from the relationship among the elements, studies their internal link. The authors have carried out tests and appraisalment of a large amount of ore samples by means of electronic detectors, laser spectra, X rays, specific gravity, microscopic pressure, chemical analysis, spectral analysis and acid immersion, and found minerals of independent existence including Ag, Cu and Sn and accompanying elements of lead and zinc ores. Some isomorphic scattering minerals of In, Cd, Ga and Ge have also been found mainly in co-existence with diorite zinc ores. A table of values is given to show the interrelationship of the isomorphic elements in diorite zinc ores.



AUTHOR: CH'I Chih-ju [4359 0037 1172]  
KUAN Ya-hsien [7070 7161 0341]

ORG: None

TITLE: "An Initial Study on the Rocky Crystal Structure of Monocline Sodium Calcium"

SOURCE: Chang-chun CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 78 pp 39-42

ABSTRACT: Monocline sodium calcium ( $\text{Na}_2\text{CO}_3 \cdot \text{CaCO}_3 \cdot 5\text{H}_2\text{O}$ ) is a hydrous carbonate mineral produced by nature first discovered in Venezuela. A rocky crystal sample of this mineral was taken for analysis from Tamasu salt lake in Kan-an County in Kirin Province. The study on crystallization and mineralogy was completed by two members of the Changchun Geological Institute, Ho Shao-wu [0149 4801 2976] and Cheng Sung-nien [6774 2646 1628]. The article shows projection pictures of vector quantity among the atoms and pictures of the distribution function of electronic density. A table shows the comparison between the experimental values and calculated values of structural factors. Another table shows the atomic coordinates (x, y and z) of the monocline sodium calcium rock. A drawing shows the structure of the rock. In conclusion, the article states that from its structure, this rocky crystal belongs to the carbonate mineral of island state because its carbonic root is distributed all alone among the positive ions of calcium and sodium.

AUTHOR: T'AN Chou-ti [6223 0719 0966]

ORG: None

TITLE: "The Controlling Significance of Structure on Rock Dissolution"

SOURCE: Chang-chun CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 78 pp 43-47

ABSTRACT: The author explains his point that in the process of growth of rock dissolution, the condition of geological structure is really the main factor playing the controlling role. As rock dissolution is closely related to the condition of hydrodynamics, many scientists laid emphasis on the effect of topographical and hydrological conditions as the basic factor controlling the growth of rock dissolution. However, he asserts that in fact, in areas of rock dissolution, the formation of topographical and hydro-geological characteristics is under the control of the rocky nature of the structure, being "plasticized" by the process of rock dissolution. They are mainly the result of rock dissolution and not the basic factor controlling the growth of rock dissolution. He explains the controlling significance of the faulted structure and overfolded structure, the complex controlling significance of structural system and structural types and the controlling significance of movements of the earth-crust in modern times.

AUTHOR: None

ORG: The Mineral Detection Instruments Laboratory

TITLE: "The Model M-1 Pulse Type Aero-Electric Instrument"

SOURCE: Chang-chun CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 78 pp 48-53

ABSTRACT: Since the end of 1973 this laboratory, in cooperation with the mineral detection team of the Heilungkiang Bureau, began to trial make pulse type aero-electric instruments and had built two sample instruments, one for communicative adjustment on ground and the other for experiment in air, and also two improved type sample instruments for use in air. In test flights, they discovered over 20 sites of abnormalities, where at 75 meters underground a low resistance layer (carbonaceous moya) was seen, proving that abnormalities in aero-electric survey reflect the changes of earth electric conditions at certain depths under the earth's surface. In November 1977 the concerned government department officially named it the Model M-1 Aero-electric Instrument. The article explains the basic principles of the instrument, describes its component parts with a block circuit diagram and reports the geological results from the use of this instrument in test flights over known magnetic iron deposit areas and the surroundings in Heilungkiang Province.

AUTHOR: CH'EN T'ien-yu [7115 1131 5280]  
WU Hsi-sheng [0702 6932 3932]

ORG: None

TITLE: "Correspondence Analysis and Its Application to Regional Survey"

SOURCE: Chang-chun CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 78 pp 53-61

ABSTRACT: In recent years, many geological workers have taken factor analysis as an effective means to process geological survey data with electronic computers. Factor analysis has two branches of Q-mode analysis and R-mode analysis, the former uses variables as coordinates, the latter uses samples as coordinates. In 1970 French scientist Benzecri combined the two modes of analysis and developed a new method, named correspondence analysis. This article presents a detailed explanation of the new method. Mathematically, the original data of variables and samples are coordinated and written into a matrix. In correspondence analysis, all data should be standardized and rewritten into differential matrices. The variables are projected and shown in graphic diagrams. A practical example of the application of correspondence analysis to the survey in a certain region of Kirin Province is reported.

AUTHOR: HSIA Li-hsien [1115 4539 7359]  
CHING I [2529 3015]

ORG: None

TITLE: "Problems on the Distortion of the Trend Surface and the Pathosis of the Canonical Equation Group"

SOURCE: Chang-chun CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 78 pp 62-78

ABSTRACT: In the mathematical study of the law of spatial distribution of geological variables, Chinese geologists have widely used the analysis of the trend surface as the method, accumulated much experience and gained a large amount of very valuable results of calculation. However, no method is perfect. In some cases, the result of calculation is different from actual geological conditions. The distortion of the trend surface and the pathosis of the canonical equation group deserve attention. The article first discusses these two problems separately, and then further discusses their relationship. It explains the method of mitigating the distortion of the trend surface and the pathosis of the canonical equation group by improving the distribution of controlling points. Finally, it gives the method of gradual regression analysis to choose the mathematical model of the trend surface.

AUTHOR: CHANG Ch'iu-sheng [1728 4428 3932]

ORG: None

TITLE: "The Current Study of Pre-Sinian Metamorphic Geology and the Forecast of Certain Mineral Deposits"

SOURCE: Chang-chun CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO [JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE] in Chinese No 2, 78 pp 79-82

ABSTRACT: Most deposits of iron, chromium, nickel and copper are found in the Pre-Sinian metamorphic complex. At present, Chinese geologists are given the important task to study and look for Pre-Sinian mineral deposits. The author states that in comparison with some foreign countries China falls far behind in the basic theoretical study of Pre-Sinian metamorphic geology. He claims that at present the crucial work is to compile a palin spastic map of China's ancient geological conditions in the Archaean Era and maps showing the **theoretical forecast and the laws on the** distribution of iron, chromium, nickel and copper deposits. In the past, many theoretical problems were not solved by the geologists who met with great difficulties in their work. They must break through some old views and study Pre-Sinian metamorphic rock formations in other parts of the world. All geologists in the country should work in cooperation to understand the early development of the earth's crust and make forecasts of major mineral deposits.

AUTHOR: LIU Chan-sheng /0491 0594 5116/

ORG: None

TITLE: "The Use of Satellite Pictures in Geodynamic Study"

SOURCE: Chang-chun CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO /JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE/ in Chinese No 2, 78 pp 83-88

ABSTRACT: This article, compiled by the author, introduces new techniques and new methods. The subject matter deals with the use of satellite pictures in the study of geodynamics. Satellite pictures constitute one of the principal data taken by earth resources technical satellites in modern space technology. MSS satellite pictures are photographic pictures showing bird's eye views of the earth's surface at the flying high altitude of 918 kilometers. Satellite pictures are very valuable materials for the study of geological structure. They are used to interpret structural traces and dynamic characteristics of the structural surface, to determine the structural system, to study the composite junction of the structural system and to carry out geodynamic theoretical study. Satellite photos of Kunming area and Ho-chih area are shown with drawings of interpretation as examples of rift structures. In geodynamic study, satellite photos are used to conduct experiments of simulation in the determination of structural systems, to conduct seismic geological study and to locate mineral deposits. The departments of petroleum and coalfields have used satellite pictures with very good results.

AUTHOR: SHAN Tse-ming /1472 0463 0682/  
WANG To-lun /3076 1122 0243/  
HOU Te-i /0186 1795 5030/  
CH'EN Ch'i /7115 3823/

ORG: None

TITLE: "Discussion of Problems in the Comparison of Data from the Exploration and Excavation of Ore Deposits"

SOURCE: Chang-chun CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO /JOURNAL OF CHANGCHUN GEOLOGICAL INSTITUTE/ in Chinese No 2, 78 pp 88-99

ABSTRACT: The comparison of data from the exploration and excavation of mineral deposits is the most reliable and basic method to prove the overall reliability of results from geological exploration. At present, many Chinese departments of geological exploration and planning and mines in operation have adopted this method. This article discusses some problems in the comparison, including the contents of comparison, the errors of comparison, the standard of errors, the basic parameters of comparison and the relationship between the errors of reserve

[continuation of CH'ANG-CH'UN TI-CHIH HSUEH-YUAN HSUEH-PAO No 2, 78 pp 88-99]

and the ratio of area duplication as well as the errors of morphological distortion. Finally, the article concludes that in the past the estimation of reserves was inaccurate. Since the adoption of the method of comparison, many new quantitative parameters have appeared. This is of very important significance to the scientific and correct determination of ore reserves of various grades.

9039

CSO: 4009

ACTA MECHANICA SINICA

AUTHOR: WANG Chao-lin [3769 3564 2651]

ORG: Tsinghua University

TITLE: "An Instability Theorem for Nonisolated Mechanical Systems With Gyroscopic Terms"

SOURCE: Peking LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] in Chinese No 3, Jul 78 pp 171-176

ABSTRACT: By proving the title theorem, the article suggests a method for analyzing an instability problem in which a possibly nonisolated system is acted on by potential and gyroscopic forces. The results of the analysis can also be applied to nonlinear systems. Two examples are raised as applications of the theorem. Also emphasized is an analysis of motion stability of two attitudes of a double spin satellite (or a gyroscopic satellite). In conclusion, main research directions are discussed regarding the control of satellite attitude.

AUTHOR: CHAO Tzu-tan [6392 1311 0030]

ORG: Tientsin University

TITLE: "Rate of Sediment Fall Under Wave Action"

SOURCE: Peking LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] in Chinese No 3, Jul 78 pp 177-181

ABSTRACT: Silt settles differently in undulating water flow compared to still water. In other words, the settling rate slows because the silt is acted on by lift in wave turbulence. Wave motion gradually attenuates from the water surface downward, therefore the slowing of the settling rate of silt under wave action also attenuates from the water surface downward. Starting from this point, a theoretical formula is deduced. Compared with experimental data, the calculation result is consistent in the correlation although the calculated value is inaccurate.

AUTHORS: LIU Ch'i-nien [2692 4860 1628]  
CHIA Fu [6328 1788]  
CHANG Tieh-li [1728 5805 7787]  
HAO Ching-yao [6787 2417 1031]  
WANG P'ing-sheng [3769 1627 3932]  
HSU Chi-hua [1776 4764 5478]

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

TITLE: "An Experimental Study on Three-dimensional Flows in Cyclone Separators"

SOURCE: Peking LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] in Chinese No 3,  
Jul 78 pp 182-191

ABSTRACT: By using two  $\phi 400$  mm and  $\phi 830$  mm experimental models, the three-dimensional velocity field and eddy intensity field are measured with comparative details with a five-hole probe and a hot-wire anemometer. The distribution of tangential velocity is in agreement with results of some other investigators. Other results are reached, such as axial nonsymmetry of diametrical velocity, stationary and inverted eddies existing at center of axial velocity distribution, and single-peak distribution of eddy intensity existing at the center. This is an examination at a preliminary stage of the problem of upper vortex-ring induced in secondary eddy.

AUTHOR: T'AO Tsu-lai [7118 4371 5490]

ORG: Institute of Mechanics, Chinese Academy of Sciences

TITLE: "On the Linear Theory of Arterial Pulsatile Blood Flow"

SOURCE: Peking LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] in Chinese No 3,  
Jul 78 pp 192-201

ABSTRACT: Dimensional analysis is used to analyze the theoretical foundation of arterial pulsating blood flow streamline with the following results:  
1. The current popular linearization condition  $(U/c) \ll 1$  and  $(R/\lambda) \ll 1$  does not adapt to arterial blood flow. The correct linearization condition should be  $[(U/c) \cdot (\lambda/L)] \ll 1$  or  $(R/L) \ll St$ . Thus, the linearization theory is adaptable to medium-size arteries. As for the main arteries, the theory may be used to analyze the relationship of pressure and flow as well as the propagation characteristics of pulsating waves; however, the theory cannot be used in finding the velocity distribution. This conclusion is in agreement with the conclusion of an experimental study. 2. Compared to the flow inertial force, the function of diametrical pressure gradient is secondary. Therefore, it is not necessary to consider the effect of the diametrical pressure gradient under linearization conditions. Lastly, solutions are obtained with the simplest flow equation by using Lou's limited amplitude translational model. The wave velocity formula derived is the same when calculating  $(\partial p)/(\partial r)$ .

AUTHOR: LIANG Hsi-san [2733 6932 0005]

ORG: Hunan Province Transportation Research Institute

TITLE: "Simple Calculation of Stresses and Displacements in Multilayer Elastic Systems"

SOURCE: Peking LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] in Chinese No 3, Jul 78 pp 202-209

ABSTRACT: The theory of laminar system elasticity has been emphasized in the designing of road surface. In many countries, there are graphs and tables for values of double-layer systems. Jones' table of stress and deflection coefficients is used extensively in two-layer systems. Since the table lists four variables and complicated interpolation is required, ordinarily computers are employed, based on Brown's interpolation program for Jones' table. However, actually this kind of road-surface structure contains more than three layers with additional variables. This article suggests a simple way of calculating stresses and displacements in multilayer elastic systems by using an equivalent-effect layer technique; a double-layer system table can be used. The method is based on the following: stress and displacement components decrease with a fundamental harmonic pattern as the thickness and modulus ratios increase. The method can be used to calculate shear stress, vertical

[continuation of LI-HSUEH HSUEH-PAO, No 3, Jul 78 pp 202-209]

stress, vertical strain and vertical displacement of multilayer systems with uniformly distributed vertical loadings. The distribution curve of vertical stress in soil foundation can also be calculated with the equivalent-effect layer method.



AUTHORS: YEN Ti-min [7346 6611 3046]  
HSU Kuo-hua [6079 0948 5478]  
HSIAO Kuo-chung [5135 0948 1813]  
CHANG Chuan-chen [1728 0278 6297]

ORG: None

TITLE: "Heat Transfer in Rectangular Ducts"

SOURCE: Peking LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] in Chinese No 3,  
Jul 78 pp 210-218

ABSTRACT: Experimental studies were conducted on the heat transfer of water in rectangular ducts. Local heat transfer coefficients of flat plates and corner regions are measured. In air circuits, the distribution of shearing stress was measured in the corner region and in the vicinity of stationary ribs of a rectangular duct. The distribution of local heat transfer coefficient is compared with the shear stress distribution. These two values are close. The shape of stationary ribs strongly affects the heat transfer coefficient of the rib region. Since it is difficult to simulate the complicated rib shape experimentally, the authors study only one condition of the rectangular duct (for rectangular-shaped ribs). The variation of the rib shape is examined by measurement of the shear stress distribution.

AUTHOR: FAN Ching-hung [5400 6975 3126]

ORG: Chungking University

TITLE: "Operating Principle and Precision of the YYBl-1 Telemetry Strain Gauge"

SOURCE: Peking LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] in Chinese No 3,  
Jul 78 pp 219-225

ABSTRACT: With assistance of the Chungking Iron and Steel Company, Tung-fang Electric Machinery Plant, Fu-hsin Instrument Plant and Chengtu Telecommunications Engineering College, the YYBl-1 telemetry strain gauge was developed in the strain telemetry laboratory of Chungking University. In gauge design, the transmission acquires the electric field coupling and low frequency wave band, thus avoiding intensive absorption of ultra short waves by metallic objects. This simplifies circuit design and improves system reliability and stability. Miniaturization is also easily adopted. In modulation, the pulse modulation system serves to upgrade the anti-interference capability of the system. Direct current is used to simplify the circuit. The gauge was operated in the steel rolling shop of the Third Chungking Steel Mill; results were satisfactory.

AUTHOR: YUN Ta-chen [0061 1129 4176]

ORG: Dairen Engineering College

TITLE: "Analysis of Shrink-fit Stresses By the Stress-freezing Method in Photoelasticity"

SOURCE: Peking LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] in Chinese No 3, Jul 78 pp 226-229

ABSTRACT: The shrink-fit technique is often used in transmitting forces or couples. For a long shrink-fit axle, the stress of the mid-section can be calculated by applying a composite thick-wall cylinder theorem, but an experimental technique should be used to analyze stresses near two terminals of a sleeve, variable-cross section axle or a short shrink-fit axle. The photoelasticity method can effectively solve the problem of analyzing three-dimensional stresses. This is the basis for the article. It describes simulation conditions, model design, model processing, experimental procedures and stress analysis.

AUTHORS: CHU Nai-i [4555 0035 1355]  
LI Hung-te [2621 4767 1795]  
TSOU Hui-liang [6760 1920 5328]  
TS'UI Chi-p'ing [1508 1323 1627]  
LI Lien-hsiang [4555 6647 4382]  
KAO Chun-chieh [7559 0193 2638]  
CHANG Jui-chih [1728 3843 2535]  
TUNG Hsiang-hung [5516 0686 4767]  
CHANG Min [1728 2404]  
HUANG Wen-kuo [7806 2429 0948]

ORG: CHU, LI, TSOU, TS'UI and LI of Institute of Mechanics, Chinese Academy of Sciences; KAO, CHANG, TUNG, CHANG and HUANG of Department of Radio, Tientsin University

TITLE: "Thin-film Radiative Heat-transfer Gauges"

SOURCE: Peking LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] in Chinese No 3, Jul 78 pp 230-233

ABSTRACT: Thin-film radiative heat-transfer gauge can measure radiative heat with high sensitivity and quick response. The gauge is fabricated by spraying carbon black onto an ordinary thin-film resistance thermometer; this covering

[continuation of LI-HSUEH HSUEH-PAO, No 3, Jul 78 pp 230-233]

agent can increase the absorption rate and extend the width of the absorption spectrum. The manufacturing technique was improved by first spraying a thin platinum film onto a glass base, then carbon is evaporated in a vacuum to cover the platinum film. The method can produce a uniform carbon film, good binding between carbon and platinum films and a wider response range extending to wavelengths shorter than  $2\mu$ . The characteristics exceed similar gauge made abroad. The authors thank SHAN Tse-chen [0830 3419 3791] for her enthusiastic assistance in spraying the platinum film.

AUTHORS: CHU Nai-i [4555 0035 1355]  
LI Hung-te [2621 4767 1795]  
TSOU Hui-liang [6760 1920 5328]  
LI Lien-hsiang [4555 6647 4382]

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

TITLE: "Measurements of Flow Parameters in a  $\phi 800$  Shock Tube"

SOURCE: Peking LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] in Chinese No 3, Jul 78 pp 234-237

ABSTRACT: In this experiment, a stainless steel circular shock tube is used; an oxy-hydrogen flame is ignited to produce a pressure of about 80 atmospheres. A hot-wire probe of the thin-film resistance thermometer type is used to measure the length of in-tube sectors and wavefront appearances; an electric probe measures boundaries. Directly or through a circuit, the signal is fed to an SBR-1 oscillograph. Most of the seven diagrams include the experimental results. The authors thank YU Hung-ju [0205 7703 0320] and SHAN Tse-chen for their assistance in using the thermoelectric equivalent circuit and in the manufacture of metallic-film hot-wire probe.

AUTHOR: WANG Yun-chien [3769 0061 0494]

ORG: Institute of Mechanics, Chinese Academy of Sciences

TITLE: "Coupled Translational and Torsional Vibration of Multistory Frames"

SOURCE: Peking LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] in Chinese No 3, Jul 78 pp 238-241

ABSTRACT: Generally, a structure is more or less eccentric; structures of this kind with centers of rigidity and mass at different points produce torsional vibrations during translation. This is called translational and torsional vibration, a form of space vibrations. This problem needs close study when earthquake-proof structures are under construction. By employing the coordinate system of the center of rigidity, equations are derived for coupled translational and torsional vibrations of multistory frames. A calculation technique is described for structural reactions during harmonic wave and seismic wave events.

AUTHOR: T'AN Kao-sheng [6151 6964 3932]

ORG: Institute of Mechanics, Chinese Academy of Sciences

TITLE: "Mechanics and Its Evolution"

SOURCE: Peking LI-HSUEH HSUEH-PAO [ACTA MECHANICA SINICA] in Chinese No 3, Jul 78 pp 242-250

ABSTRACT: The era of modern science began in the 17th century with the combination of astronomy, mechanics and mathematics. Johannes Kepler (1570-1630), Galileo Galilei (1564-1642) and Isaac Newton (1642-1727) laid a sturdy foundation for science. More than three centuries' scientific development was then underway. From the 18th century to the end of 19th century, Newtonian mechanics ruled unchallenged. In the same age, thermodynamics, acoustics, optics and electromagnetism emerged. A new form of mechanics developed in the 20th century in relativistic mechanics, and quantum and wave mechanics. Supplementing Newtonian mechanics is wave mechanics in the microscopic world and relativistic mechanics in the macroscopic world.

10424  
CSO: 4009

ACTA METALLURGICA SINICA

AUTHOR: None

ORG: Fatigue Research Group, Institute of Metal Research

TITLE: "X-Ray Stress Measurement Technique By Side Inclination Method Without  $-\eta$  Inclining Incident Angle"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 13 No 1, 2, Jun 77 pp 1-22

TEXT OF ENGLISH ABSTRACT: The stress calculation formulas for side inclination method without  $-\eta$  inclining incident angle have been deduced based on their special geometrical relations, the results obtained being as follow:

$$2\theta = a \sin^2 \psi_0 + b \sin \psi_0 + c, \sigma_x = (K \sec^2 \eta_0) a, \tau_{xy} = (-K \csc 2\eta_0) b$$

After measuring a set of  $2\theta$  values corresponding to the incident angles  $\psi_0$  by this method, the coefficients  $a$  and  $b$  in the parabola equations can be calculated by  $\pm \psi_0$  linear method or  $\pm \psi_0$  parabola method as presented in the text, and normal stress  $\sigma_x$  in the measurement direction and shearing stress  $\tau_{xy}$  in the plane to which  $\sigma_x$  is applied can thus be obtained. Results of error analysis show that the stress calculation formulas and the above  $\pm \psi_0$  methods can satisfy requirements for either engineering or laboratory practice.

[continuation of CHIN-SHU HSUEH-PAO Vol 13 No 1, 2, Jun 77 pp 1-22]

As  $\sigma_x$  and  $\tau_{xy}$  can be obtained simultaneously by a single measurement with this method, so the state of stress at any point on the surface of the object can be determined by measuring only in two directions at this point.

If the  $2\theta$  values measured by side inclination method without  $-\eta$  inclining incident angle were treated by the stress calculation formulas of the conventional method or the side inclination method with  $-\eta$  inclining incident angle, a large systematic error may often be introduced, its magnitude being decided mainly by the real values of  $\sigma_x$ ,  $\tau_{xy}$  and  $\eta_0$ .

The above derived stress calculation formulas are substantiated by experimental results.

AUTHOR: None

ORG: Research Institute of Wuhan Iron and Steel Company

TITLE: "A Copper-Containing Low Alloy Steel Rail of Grade 45 kg/m"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 13 No 1, 2, Jun 77 pp 23-34

TEXT OF ENGLISH ABSTRACT: Intending to utilize certain iron ores contaminated with copper, a copper-containing low alloy rail steel (WP2) has been developed by Wuhan Iron and Steel Company. Such a rail steel containing 1% Si has been adopted for our own design of rails of grade 45 kg/m. It possesses high strength ( $\sigma_b \geq 92 \text{ kg/mm}^2$ ) and hardness (on rail top  $\geq 280 \text{ HB}$ ) with satisfactory toughness and plasticity as well as good resistance to wear and to atmospheric corrosion. This kind of rail may be used without quenching. Long time railway running tests showed that such a rail (WP2) performs well against wear and impact, exhibiting little corrosion at rail waist and bottom. It has been used not only in Chinese railways but also in the Tanzania-Zambia railway in Africa.

AUTHOR: None

ORG: Ore Dressing Equipment Research Group, Kwangtung Institute of Non-Ferrous Metal Research

TITLE: "A Newer Slime Concentrator--'The Vibrating-Shaking Vanner'"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 13 No 1, 2, Jun 77 pp 35-45

TEXT OF ENGLISH ABSTRACT: Combining the effective actions of vanning, tabling and heavy mineral panning, a new type of slime concentrator, called "the vibrating-shaking vanner," has been developed. This concentrator is characterized by concentration of heavy mineral grains in sub-sieve range. Its remarkable performance is of higher recovery, as well as of higher ratio of concentration. The lower limit of the grain size which can be effectively concentrated is about 20 microns. In the case of concentrating the slime of tungsten, tin or niobium-tantalum ores, comparative tests on the vibrating-shaking vanner against common table and vanner generally gave better results, especially for grain size down to 40 microns. Furthermore, this vanner can also be applied for table-flotation of slime concentrates in order to separate sulphides or to recover heavy minerals from flotation concentrates contaminated with sulphides. Long time service has proved that the above vanner gives good performance and its application in metallurgical industry is ever increasing.

AUTHOR: LIU Shu-i [0491 0647 0308]

ORG: University of Science and Technology of China

TITLE: " $J(\frac{\tau_0 \gamma_0}{x_1 x_2})$  and Theoretical and Experimental Proof of Path Dependence of J-Integral for Plastic Fracture"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 13 No 1, 2, Jun 77 pp 46-56

TEXT OF ENGLISH ABSTRACT: In this work, Rice's J-integral was re-examined both mathematically and physically. J and the work density pfaffian  $\delta W$  are

$$J = \int_r F \cdot dR = \int_r [F_1 dx_1 + F_2 dx_2] = \int_r \left[ W dx_2 - T \cdot \frac{\partial u}{\partial x_1} ds \right]$$

$$\delta W = f \cdot dR = f_1 dx_1 + f_2 dx_2 = \left( \sigma_{Ki} \frac{\partial \epsilon_{Ki}}{\partial x_1} \right) dx_1 + \left( \sigma_{Ki} \frac{\partial \epsilon_{Ki}}{\partial x_2} \right) dx_2$$

It follows that the n. and s. condition for J to be path independent is that in simply connected region:

$$|\nabla \times F| = \left( \frac{\partial W}{\partial x_1} - \sigma_{Ki} \frac{\partial \epsilon_{Ki}}{\partial x_1} \right) = 0 \quad (1)$$

which demands that  $\delta W$  be a complete differential  $dW$  in the same simply connected region:

[continuation of CHIN-SHU HSUEH-PAO Vol 13 No 1, 2, Jun 77 pp 46-56]

$$|\nabla \times f| = \left( \frac{\partial f_2}{\partial x_1} - \frac{\partial f_1}{\partial x_2} \right) = 0 \quad (2)$$

This is the n. and s. condition for  $\delta W = dW$  and therefore, the n. and s. condition for J to be path independent.

The same result for  $|\nabla \times f|$  was obtained by using two different expressions for  $\delta W$ :

$$\left. \begin{aligned} \delta W &= \sigma_0 d\epsilon_0 + \frac{3}{2} \tau_0 d\gamma_0 \\ \sigma_0 &= \frac{1}{3} \sigma_{KK}; \quad \epsilon_0 = \epsilon_{KK} \end{aligned} \right\} \quad (3)$$

$\tau_0, \gamma_0$  -- octahedral shear stress, strain.  
or:

$$\left. \begin{aligned} \delta W &= \sigma_{Ki} d\epsilon_{Ki} \\ \sigma_{Ki} &= C_{Kijn} \epsilon_{jn} \dots \dots \text{non-linear} \\ C_{1111} &= C_{2222} = C_{3333} = \left( A + \frac{2\tau_0}{\gamma_0} \right) \\ C_{1122} &= C_{2211} = C_{2233} = C_{3322} = C_{3311} = C_{1133} = A \\ C_{1212} &= C_{2121} = C_{2323} = C_{3232} = C_{3131} = C_{1313} = \frac{2\tau_0}{\gamma_0} \\ \text{other } C_{Kijn} &= 0 \\ A &= \left( \frac{\sigma_0}{\epsilon_0} - \frac{2\tau_0}{\gamma_0} \right) \end{aligned} \right\} \quad (4)$$

[continuation of CHIN-SHU HSUEH-PAO Vol 13 No 1, 2, Jun 77 pp 46-56]

It turns out that:

$$|\nabla \times f| = \begin{vmatrix} \frac{\partial \sigma_0}{\partial x_1} & \frac{\partial \sigma_0}{\partial x_2} \\ \frac{\partial \epsilon_0}{\partial x_1} & \frac{\partial \epsilon_0}{\partial x_2} \end{vmatrix} + \frac{3}{2} \begin{vmatrix} \frac{\partial \tau_0}{\partial x_1} & \frac{\partial \tau_0}{\partial x_2} \\ \frac{\partial \gamma_0}{\partial x_1} & \frac{\partial \gamma_0}{\partial x_2} \end{vmatrix} = J \left( \frac{\sigma_0 \epsilon_0}{x_1 x_2} \right) + \frac{3}{2} J \left( \frac{\tau_0 \gamma_0}{x_1 x_2} \right)$$

$$= \begin{cases} 0 & \dots \dots \dots \text{elastic body} \\ \frac{3}{2} J \left( \frac{\tau_0 \gamma_0}{x_1 x_2} \right) \neq 0 & \dots \dots \dots \text{incompressible plastic body} \\ J \left( \frac{\sigma_0 \epsilon_0^p}{x_1 x_2} \right) + \frac{3}{2} J \left( \frac{\tau_0 \gamma_0}{x_1 x_2} \right) & \dots \dots \dots \text{compressible plastic body} \end{cases}$$

$\neq 0 \dots$  at least for small  $\epsilon_0^p$

These conclusions follow from the law of Jacobian and experimental facts. At constant temperature,  $\tau_0 - \gamma_0$  relation is not functional, but band-natured due to physical effects such as strain-thermal history and strain-aging.

According to the above conclusions, J is not path independent for both compressible and incompressible cases.

Perhaps the case of monotonous deformation without unloading may be excluded from

[continuation of CHIN-SHU HSUEH-PAO Vol 13 No 1, 2, Jun 77 pp 46-56]

the above conclusions. However, such exclusion is denied by physical, technical and natural factors that break the functional relation between stress and strain, such as:

- a) plastic deformation under designed constant stress attained by monotonous loading;
- b) stress relaxation under designed constant strain attained by monotonous loading;
- c) fluctuation of mechanical conditions encountered by static members in their service.

For brittle fracture, J becomes a criterion  $J_c$  through elastic potential energy P and Griffith condition; but in the case of plastic fracture, the path independence of J and its qualification as a criterion for fracture are both questionable.



AUTHOR: CH'EN Ch'ih [7115 4654]

ORG: None

TITLE: "On the Criterion for Crack Extension"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 13 No 1, 2, Jun 77 pp 57-72

TEXT OF ENGLISH ABSTRACT: Based on the inevitable blunting of the crack tip and the finiteness of stress and strain, it is shown that the basic criterion for crack extension is either the maximum shear stress criterion (for ductile fracture) or the maximum principal stress criterion (for cleavage fracture) after analyzing three series of experimental datum. Critical relations can be deduced under specific conditions. In the case of plane strain and small scale yielding, this critical relation is just the well-known  $K_I = K_{IC}$  = material constant; whereas, in the case of plane stress and small scale yielding, the critical relation deduced is  $K_C =$

$\sqrt{\frac{\pi}{8} k \sigma_F \epsilon_F^2 B E}$ . Factors effecting  $K_{IC}$  were also discussed.

AUTHOR: None

ORG: Electron Microscopy Laboratory, Institute of Metal Research

TITLE: "The Application of Minicomputer in Electron Diffraction Studies. III. Indexing of Electron Diffraction Patterns of Single Crystals with Unknown Lattices"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 13 No 1, 2, Jun 77 pp 73-79

TEXT OF ENGLISH ABSTRACT: A computer program in FORTRAN to aid indexing of electron diffraction patterns of single crystals with unknown lattices has been written. By tilting the crystalline specimen two electron diffraction patterns are obtained, from which three diffraction spots are chosen corresponding to three base vectors of a primitive triclinic reciprocal cell. The lengths of reciprocal lattice vectors with  $4 \leq h, k, l \leq 4$  have been calculated and the three shortest non-coplanar vectors are chosen as the base vectors of the reciprocal Buerger cell, from which the lattice parameters of Bravais lattice and the indices of diffraction spots are determined.

AUTHOR: None

ORG: Silicon Iron Research Group, Peking Institute of Iron and Steel Research

TITLE: "Effects of Aluminum on Commercial Grain Oriented 3% Si-Iron with MnS as the Main Second Phase"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 13 No 1, 2, Jun 77 pp 80-92

TEXT OF ENGLISH ABSTRACT: The effects of aluminum on the hot rolling structure and texture, primary recrystallization, secondary recrystallization and magnetic properties of commercial grain oriented 3% Si-iron with MnS as the main second phase have been investigated. It was found that within the range of 0.007 to 0.040% aluminum content (acid soluble) in silicon iron, the magnetic induction of the product,  $B_{10}$ , could reach 18,000 G until the temperature of the slab reheating prior to hot rolling was about 1,250°C. With soluble aluminum contents outside this range, the value of  $B_{10}$  was sharply decreased as the slab reheating temperature was lowered. The deformation structures and textures of the hot rolled sheets in mid-thickness layer varied with the variations of the soluble aluminum contents in silicon iron as shown by the corresponding changes of structures after primary and secondary recrystallization. Although the role of aluminum played in the silicon iron may be traced back prior to the hot rolling, it appears that aluminum mainly influences the deformation,

[continuation of CHIN-SHU HSUEH-PAO Vol 13 No 1, 2, Jun 77 pp 80-92]

dynamic precipitation of the second phase and dynamic recrystallization processes of the material during hot rolling. Further studies are necessary to clarify the exact mechanism involved in the effect of aluminum in grain oriented 3% Si-iron.

AUTHOR: LO Yang [5012 7122]

ORG: None

TITLE: "Quantitative Determination of Grain Orientation and Texture by Etch-Figure Method"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 13 No 1, 2, Jun 77 pp 93-108

TEXT OF ENGLISH ABSTRACT: The etch-figure method, which is useful for determining the crystal orientations of grain oriented silicon iron with sufficient accuracy for industrial practice, has been examined. In this paper an attempt has been made to measure the orientations of the secondary recrystallized grains by means of this method, the distribution and the changes of the textures in the longitudinal section along certain depths being observed.

The preparation of the specimens has been described and a method of determining the grain orientations by using the geometrical parameters of the etch-figures is given. In order to determine the orientations, three angular parameters are used: angle  $\theta$  between the rolling direction and the projection of  $[001]$  on the surface of sheet; angle  $\phi$  between  $[001]$  and the surface of the sheet; and angle  $\omega$  between  $[1\bar{1}0]$  and the sheet surface. The geometrical parameters of both triangular and rectangular

[continuation of CHIN-SHU HSUEH-PAO Vol 13 No 1, 2, Jun 77 pp 93-108]

etch-figures produced by  $\{100\}$  -attack as functions of  $\phi$  and  $\omega$  have been deduced. For practical uses in the orientation determination, the relationship between the etch-figure parameters and the corresponding  $\phi$  and  $\omega$  are listed in tables. With known values of  $\theta$ ,  $\phi$  and  $\omega$ , the  $\{100\}$  pole figures can be drawn to show the degree of misorientation of the material.

AUTHOR: None

ORG: Research Institute of Tayeh Steel Works

TITLE: "An Investigation of Some High Carbon Chromium Bearing Steel Ingots"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 13 No 1, 2, Jun 77 pp 109-121

TEXT OF ENGLISH ABSTRACT: Nine high carbon chromium bearing steel ingots melted and teemed by different processes have been sectioned longitudinally and their macro-structure, including distribution of non-metallic inclusions and carbides as well as gas content, etc., have been examined. Ingots made by electroslag refining and solidifying in water cooling crystallizer showed better quality than those made by the conventional process, especially for slabs or ingots with smaller cross sections. High temperature diffusion annealing treatments promote the refinement of the macro-structure of ingots. Vacuum melting and teeming are very effective for the improvement of the quality of ingots.

AUTHOR: None

ORG: Fracture Research Group, Institute of Metal Research

TITLE: "An Investigation on Determining  $J_{Ic}$  and  $J_{Isc}$  by the Cantilever Beam Method"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 13 No 1, 2, Jun 77 pp 122-128

TEXT OF ENGLISH ABSTRACT: The delayed failure of a steel structure occurs as a result of the stress corrosion cracking and hydrogen embrittlement and similar brittle fracture may also happen at the site of the fatigue or weld cracks. The prediction of such failures has attracted the attention of many investigators.

The concepts of J-integral in elastic-plastic mechanics have been introduced to investigate the delayed failure, and the method which can determine the critical values of J-integral  $J_{Ic}$  and the threshold values of stress corrosion cracking  $J_{Isc}$  with a cantilever beam bend specimen having a fatigue crack introduced artificially has been proposed. The  $J_{Ic}$  and  $J_{Isc}$  values for 40CrNiMo steel specimens in a solution of hydrogen sulphide have been determined. Such a method has been examined:

- (1) by comparing the  $J_{Ic}$  values with those obtained from the three-point bend method;
- (2) by comparing the stress intensity factor  $K_I$  with those which can be determined

[continuation of CHIN-SHU HSUEH-PAO Vol 13 No 1, 2, Jun 77 pp 122-128]

directly by linear elastic fracture mechanics. Based on the above results, the characteristics of the cantilever beam method have been discussed.

AUTHOR: None

ORG: Forging and Stamping Faculty, Shanghai Chiao'ung University

TITLE: "Some Problems of the Application of Cold Extrusion Techniques"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 13 No 1, 2, Jun 77 pp 129-138

TEXT OF ENGLISH ABSTRACT: In China, the application of cold extrusion has been very rapid. Several kinds of hard metal have been successfully cold extruded into parts of complicated shapes. Evidently, the technology of cold extrusion will play an ever increasingly important role in our socialist construction.

During cold extrusion, the die exerts a high pressure on the material to be extruded and forces it to deform, whereas the material exerts a reaction on the die to resist its being deformed. Deformation and resistance against deformation are two contradictory aspects which determine the nature of the process of cold extrusion from beginning to end. However, attention must be drawn to the transformation of the contradiction. For example, the difference of the flowing rates of metallic particles usually becomes the principal aspect of the contradiction when pure aluminum or unsymmetrical steel parts to be slightly deformed are cold extruded.

[continuation of CHIN-SHU HSUEH-PAO Vol 13 No 1, 2, Jun 77 pp 129-138]

Workers in China have made contributions to the raising to the allowable deformation extent. In their actual productions, extrusion pressure may reach, under some circumstances, as high as  $300 \text{ kg/mm}^2$ , under which punches can still be used 50,000 times and dies 200,000 times before they are worn out.

Based on our experiences gained in actual production and on the theory of concentration of stresses, the principle of "dividing dies before cracking" has been adopted in designing dies, which may considerably prolong their effective life.

This paper describes the combined technology of extrusion-upsetting in cold extrusion and the combined extrusion of stainless steel. It seems that the correct choice of substitute materials suitable to the characteristics of cold extrusion could make the cold extrusion more promising in its application than ever before.

8650

CSO: 4009

AUTHOR: None

ORG: "Three-in-one" Research Group of Peking Institute of Iron and Steel Technology, Institute of Peking Machine Tools Works, and Institute of Metal Research

TITLE: "Evaluation of Brittleness of the Nitriding Coating in Some Steel by Acoustic Emission Technique"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] Vol 13 No 1,2, in Chinese Jun 77 pp 139-144

ABSTRACT: The nitriding treated structural steel may be regarded as a compound material. Its core is highly resilient steel of medium strength. It is wrapped in a nitride coating of 0.25-0.50 mm in thickness. This surface is very hard and brittle. The plastic deformation strength of this type of compound materials is not determined by the plasticity of the core materials, but mainly by that of the nitriding coating. On the other hand, the core has a supportive function; within a certain limit, the greater is the support, the smaller is the possibility of breaking of the nitriding coating. The load capacity of such materials is, therefore, determined by the resilience of the nitriding coating and the strength of the core, and not vice versa. With acoustic emission technique,

[continuation of CHIN-SHU HSUEH-PAO Vol 13 No 1, 2, 1977 pp 139-144]

bending experiments were carried out on samples of 38CrMoAl and other steels, treated with the common gaseous nitriding process or the ion nitriding technique. The acoustic emission technique was found to be effective for determining the exact point of breaking. Coordinated with mechanical property tests, the acoustic emission technique may also determine the energy absorption before breaking to make it possible to compare the brittleness of the nitriding coating of samples of different nitriding processes.

AUTHOR: YEH Li [0673 6849]

ORG: Institute of Ta-yeh Steel Works

TITLE: "Identification of Cellular Precipitates From Iron Base Ausaging Alloy 25Ni-15Cr-2Ti-Al"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] Vol 13 No 1,2, in Chinese Jun 77 pp 145-147

ABSTRACT: In the process of studying the range of composition of iron base ausaging alloy 25Ni-15Cr-2Ti-Al, it was discovered that when the alloy contained about 2 percent of titanium with the aluminum content greater than 0.45 percent, after one hour of 980°C, 16 hours of oil cooling + 720°C, and normal heat treatment air cooling, a type of cell-like austenized precipitates appeared. For the purpose of clarifying the cellular phase of the precipitates, a series of identifications were made. The results of the study excluded the possibility of these precipitates being austenites and proved that they belonged to the  $\gamma'$  phase. When the aluminum content of this alloy was less than 0.40 percent while the titanium content was raised from 1.44 to 2.51 percent, these cellular structures could no longer be observed. This result indicated that they are products of given conditions and are relatively rare. This paper was received for publication on 11 October 1975.

AUTHOR: YIN Jui-yu [3009 3843 6877]  
WU Shih-lin [0702 4258 7792]  
LIU Jen-kang [0491 0088 0474]

ORG: All of the Research Institute of T'angshan Iron and Steel Company

TITLE: "Viscous Slag Operation for Steel Making in Oxygen Side-Blown Converters"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 14 No 1, Mar 78 pp 1-16

TEXT OF ENGLISH ABSTRACT: The very vigorous agitation at the interface on molten metal and slag in oxygen side-blown steel-making converters is a special feature which promotes the application of viscous slag operation.

An investigation of end-point blow slags in the above-mentioned converter has shown that many different types of viscous slags were corroded a little to the tarred dolomite lining bricks, and in certain cases the fused slags appear to stick and to creep upwards along the brick lining, forming a protection against erosion during operation. Thus, the application of viscous slag operation would appear to be prolonging the life of converter lining in steel making.

[continuation of CHIN-SHU HSUEH-PAO Vol 14 No 1, Mar 78 pp 1-16]

The nature of converter atmosphere at the time interval between the blowing periods and its interaction with slag have been investigated as certain atmospheres are capable of reducing FeO in slag on thermodynamical considerations. In such cases, it has been observed that when the total FeO of mean end-point blow slags was less than 12%, such slags in their usually fused condition stick and creep upwards along lining bricks. The slags which crept upwards were chiefly composed of  $3\text{CaO}\cdot\text{SiO}_2$  and  $2\text{CaO}\cdot\text{SiO}_2$ , with rather low  $2\text{CaO}\cdot\text{Fe}_2\text{O}_3$  and other ferrous mineral contents. It would appear that the " $\Sigma\text{FeO}$ " in the original end-point blow slag of higher melting temperature in its course of creeping upwards was progressively reduced by the converter atmosphere with the result of forming solid phases of higher melting temperature, such as  $3\text{CaO}\cdot\text{SiO}_2$  and  $2\text{CaO}\cdot\text{SiO}_2$ .



AUTHOR: None

ORG: Cassiterite Flotation Research Group, Changsha Institute of Mining and Metallurgy Research

TITLE: "An Investigation of Cassiterite Flotation Using Mixed Toly Arsenic Acid"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 14 No 1, Mar 78 pp 17-26

TEXT OF ENGLISH ABSTRACT: The capacity of tolyl arsenic acids for collecting cassiterite has been investigated. It is shown that mixed tolyl arsenic acid was much superior to either para- or ortho-isomer alone for cassiterite flotation. Mixing ratios between para- and ortho-tolyl arsenic acids ranging from 50:50 to 30:70 were effective with a peak value at 45:55, in which a maximum collecting capacity was obtained. The preparation of mixed tolyl arsenic acid was more convenient than that of para-isomer, a conventional collecting agent for cassiterite flotation. In the plantscale flotation of cassiterite slimes assaying from 0.6 to 0.7% Sn, tin concentrates with the grade of about 25.65% were obtained, the total recovery being about 58.64%. Cassiterite flotation using mixed tolyl arsenic acid as collectors and sodium carbonyl methyl cellulose as depressing agents for calcite have already been put into industrial practice.

AUTHOR: PAO Ch'ao [7637 6389]  
HUANG Chi-shang [7806 7139 0794]

ORG: Both of the Changsha Institute of Mining and Metallurgy Research

TITLE: "On Factors Controlling the Quality of Antimony White Pigment"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 14 No 1, Mar 78 pp 27-32

TEXT OF ENGLISH ABSTRACT: Antimony white as a pigment is mainly judged by the degree of whiteness. In order to improve the quality of the product, tests were carried out to investigate the effect of contamination by impurities, the shape and size of the grains, and the crystal structure of antimony oxides. At the same time, methods of producing superfine antimony white on a large scale were also investigated. It was found that among the many factors, the crystal structure of the grains was most important, thus the greater the amount of cubic antimony trioxide present, the better the quality of antimony white as revealed by its whiteness. Furthermore, long time tests on a large scale showed that the best quality of antimony white powders could be obtained by suitable control of the primary and secondary oxidizing blast, the forced air cooling flow and the reaction

[continuation of CHIN-SHU HSUEH-PAO Vol 14 No 1, Mar 78 pp 27-32]

chamber temperature.

\* Also taking part were HUANG Chien-k'ang [7806 0256 1660], TS'AO I-hua [2580 1150 5478], YANG Wen-ch'ao [2799 2429 6389] and MO Shan-hsiang [5459 0810 3276].

AUTHOR: CH'EN I-chih [7115 2496 0037]  
MA Tai [7456 7818]  
KO Ming [5514 2494]  
WANG O-shen [3769 6166 6500]

ORG: All of the Peking Institute of Iron and Steel Research

TITLE: "An Electron Microscope Observation on the Distribution of MnS Precipitates in Grain Oriented 3% Si-Iron"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 14 No 1, Mar 78 pp 33-39

TEXT OF ENGLISH ABSTRACT: The morphologies and distributions of MnS precipitates in grain oriented 3% Si-Fe during the early stage of the secondary recrystallization have been examined by electron microscope. The lowest temperature at which the breakdown of primary grain boundary inhibition provided by MnS precipitates could occur was found to be about 1000°C for common grain oriented 3% Si-Fe. The necessary condition to obtain stabilized primary grain matrix was that the average size of original distribution stabilized primary grain matrix was that the average size of original distribution field of MnS particles in the as-decarburized state approaches the Zener critical size of particles below which effective inhibition action occurs. It was found that the breakdown of MnS precipitates inhibition

[continuation of CHIN-SHU HSUEH-PAO Vol 14 No 1, Mar 78 pp 33-39]

could not be related to the distribution characteristics of coarsening particle field. The breakdown of the precipitates inhibition action upon primary grain boundary above 1000°C might be ascribed to the complete dissolving of the precipitates below Zener critical size at this temperature.

AUTHOR: HSU Ch'ih [1776 7459]  
YU Jui-chen [0151 3843 3791]

ORG: Both of the Shanghai Institute of Metallurgy, Chinese Academy of Sciences

TITLE: "Fracture Toughness and Fatigue Fracture of Rare Earth-Magnesium Nodular Cast Iron"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 14 No 1, Mar 78 pp 40-50

TEXT OF ENGLISH ABSTRACT: The endurance of rare earth-magnesium nodular cast iron to fracture under static and dynamic loads is shown to be more accurately represented by the parameters of fracture mechanics rather than by impact toughness. Parameters such as  $K_{IC}$ ,  $da/dN$  and  $\Delta K_{th}$  are represented. With the intention of clarifying the effect of various metallographic structures upon the fracture toughness of the material, the rate of spheroidization, the morphology of graphite, the size of spherulites, the matrix structure, etc., were separately examined. At the same time, crack propagation characteristics for different stages of fatigue fracture were also investigated. It is recommended that nodular cast iron could be of greater strength and better toughness provided that its microstructure is improved.

[continuation of CHIN-SHU HSUEH-PAO Vol 14 No 1, Mar 78 pp 40-50]

\* Help was received from the Yung-k'ang Tractor Plant, Chekiang; HSU Han-fan [1776 3352 5672] of the Chekiang Mechanical Sciences Institute; CHU Chien [2612 0256] of the Electron Microscope Group, Shanghai Institute of Metallurgy.

AUTHOR: YANG Ying-ch'ang [2799 2019 2490]

ORG: Department of Physics, Peking University

TITLE: "The Magnetic Properties and Mössbauer Spectra of  $Y_2(Fe_{1-x}Ni_x)_{17}$ "

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 14 No 1, Mar 78 pp 51-57

TEXT OF ENGLISH ABSTRACT: The Curie temperature of  $Y_2(Fe_{1-x}Ni_x)_{17}$  varied with its nickel contents (x) and a maximum  $T_C$  of 625 K occurred at  $x = 0.3$ . In order to investigate the effect of the replacement of Fe atoms by Ni atoms on the magnetic properties of such compounds, easy directions of magnetization were determined by X-rays for different Ni contents, and the dependence of the saturation magnetization in a magnetic field of up to 70,000 Oe on x values of the compounds was also studied. Mössbauer spectra of  $Y_2Fe_{17}$  and  $Y_2(Fe_{0.9}Ni_{0.1})_{17}$  were taken to ascertain order or disorder distributions of Ni atoms in the crystalline lattices. An explanation of the cause of variation of Curie temperature with the Ni contents of the compounds has been given on the basis of the above results.

AUTHOR: YANG Ch'uan-ching [2799 0278 7234]  
HUANG Shao-ch'uan [7806 4801 3123]  
WANG Nai-li [3769 0035 4721]  
HO Fu-hsiang [0149 1381 7449]  
SU Ying-wei [5685 5391 1983] [deceased]

ORG: All of the Shanghai Institute of Metallurgy, Chinese Academy of Sciences

TITLE: "Embrittlement of Titanium Alloy TA8 After Long Time Exposure at High Temperatures"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 14 No 1, Mar 78 pp 58-65

TEXT OF ENGLISH ABSTRACT: An investigation of the thermal stability of titanium alloy TA8 (Ti-5Al-2.5Sn-3Cu-1.5Zr) showed that the embrittlement was closely related to the surface structures of the alloy. The formation process of such surface structures has been discussed. Due to the fact that oxygen diffuses into the matrix of the alloy during thermal exposure, the precipitation of  $Ti_2Cu$  and  $\alpha$ -ordered phase in high oxygen solid-soluted surface and/or near surface layers may play an important role in causing the embrittlement of the alloy.

AUTHOR: CHENG Shang-wu [6774 1424 2976]

ORG: None

TITLE: "Application of Pulsed Plasma Arc Welding to Boiler Tubing System Jointing"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 14 No 1, Mar 78 pp 66-72

TEXT OF ENGLISH ABSTRACT: A pulsed plasma arc all-position welding technique has been successfully applied to the superheater and reheater tubing system jointing of power boilers on a large scale. The effect of processing conditions on welding puddle control and the coordination of the various main parameters from which the primary controlling parameter was chosen have been investigated. It was observed that gas pores caused either by incomplete penetration or by unstable molten puddle constituted the main weld defects, and certain remedial measures were found to be effective. The sound effect produced by the plasma jet impulse through keyhole has been considered useful in monitoring weld penetration and it may serve as a signal for performance control of the above welding technique.

AUTHOR: NI Jui-ch'eng [0242 3843 3397]  
CHU Feng-wu [2612 6646 0710]

ORG: Both of Peking Institute of Iron and Steel Technology

TITLE: "Carbon Migration Through the Welding Joints of Dissimilar Steels"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] in Chinese Vol 14  
No 1, Mar 78 pp 96-106

TEXT OF ENGLISH ABSTRACT: Based on the concept of thermodynamical activity, carbon migration through the welding joint of dissimilar steels has been discussed. Apart from their difference in composition, their different crystal structures if exist may markedly influence the carbon migration and the effect of phase transformation must also be considered. The processes of the carbon migration may be classified as: 1. migration takes place quickly at high temperatures, the precipitation of preeutectoid ferrite may give rise to violent migration; 2. migration takes place slowly at rather low temperatures, the diffusion rate of such elements as chromium, which has a strong tendency to form carbide, may be vital for carbon migration. The suggestion has been put forward on using thermodynamic and kinetic considerations in retarding carbon migration in both cases cited above.

8650

CSO: 4009

AUTHOR: KUO K'o-hsin [6751 0668 0207]

ORG: Institute of Metal Research, Chinese Academy of Sciences

TITLE: "Phases in High Alloy Steels and Superalloys"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] Vol 14 No 1,  
Mar 78 in Chinese pp 73-95

ABSTRACT: Superalloys are alloys with iron, nickel, or cobalt as the basic unit, to be used under high temperature conditions. Some of these depend on carbonization for reinforcement, others depend upon the interphase ( $\gamma'$  or  $\gamma''$ ) created between nickel and such as aluminum, titanium, niobium, etc. These stainless and heat-resistant steels and superalloys contain alloys belonging mostly to transitional metals of IV, V, VI families, with phases varying according to composition and heat treatment system. This paper introduces the composition, structure, and condition of occurrence of these phases under the classification of carbides, nitrides, borides, silicides, sulfides,  $\gamma'$  and other Ni-Al compounds, topological close-packed phases. Phase computation and alloy design of superalloys are briefly discussed. Literatures concerning phases in superalloys and the relationship between the structure and the property are recommended.

AUTHOR: CH'EN Lien [7115 1670]

ORG: None

TITLE: "An Examination of Matt-Facet Fractures in High Speed Steels"

SOURCE: Shenyang CHIN-SHU HSUEH-PAO [ACTA METALLURGICA SINICA] Vol 14 No 1,  
Mar 78 in Chinese pp 107-110

ABSTRACT: After W18Cr4V high speed steels are forged and rolled into rods, dark gray strips (Matt-facet) appear on the vertical fractures in varying lengths and widths. These strips may be divided into three types: (1) Invisible to the naked eye but visible under microscope of above 10 magnification; (2) Faint to the naked eye but clear under microscope; (3) Clearly visible to the naked eye. An experiment was carried out to observe the fractures, to analyze the metal phases, and for electron probing, and electron microscopic observation and scanning. The sample fractures examined are in the hot-rolled state without being heat treated.

This paper was received for publication on 15 October 1977.

6168

CSO: 4009

SCIENCE PICTORIAL

AUTHOR: TENG Hsi-ming [6772 6932 6900]

ORG: Shanghai Optical Instrument Plant

TITLE: "Laser Nuclear Fusion -- An Important Application of Laser Technology"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 6, Jun 78 pp 6-7

ABSTRACT: The role laser technology may play in nuclear fusion of deuterons and tritons as a means of generating energy so much in need today is described with the following specific topics: Revelation of the source of solar energy; An ignition temperature in excess of a hundred million degrees; A brand new ignition method; Lawson's criterion; Magnetic confinement and optical compression; Centripetal compression technique. Included also are three drawings illustrating 1) an artist's conception of a laser bombardment chamber, 2) deuteron-deuteron fusion and deuteron-triton fusion reactions, and 3) torus magnetic confinement apparatus.

AUTHOR: KU Li-chih [7357 6849 0037]

ORG: None

TITLE: "Composite Materials -- New Industrial Materials"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 6, Jun 78 pp 8-9, 39

ABSTRACT: The composition, the method of fabrication, and the applications of various composite materials are described. The following types of composite materials are described: 1) Fiber composite materials: glass fiber, asbestos fiber, plant fiber, synthetic fiber, carbon fiber, and single crystal; 2) Laminated composite materials: two-layer, multilayer, metal and coating; 3) Powder composite materials: metal powder and metal, metal powder and plastics; ceramic powder and metal, metal oxide and metal, carbide and metal; 4) Skeletal composite material: impregnated porous material, sandwich or low density composite, etc.



AUTHOR: FAN I-chi [5400 5030 4480]

ORG: Shanghai Plant Physiology Research Institute

TITLE: "Artificially Simulated Photosynthesis"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 6, Jun 78  
pp 10-12

ABSTRACT: Photosynthesis, since it was discovered some 200 years ago, has been the center of interest and the subject of many intensive studies. People wish to be able to simulate photosynthesis so that synthetic food production may be realized someday. This article begins with a brief review of the mechanism of photosynthesis that occurs in nature with descriptions of the light reactions, dark reactions and the Calvin cycle. The two theories concerning the mechanism of light reactions, e.g., the two photochemical reactions theory on the one hand and the catalytic electron theory proposed by Chinese in 1964 on the other hand, are then described briefly. The latter theory, they say, is not only capable of explaining a series of known phenomena of photosynthesis satisfactorily but also predicts some yet undiscovered phenomena of photosynthesis. Some attempts made in the past to simulate photosynthesis based on the two photochemical reactions theory and the attempts made by Chinese since 1974 based on the catalytic electron theory are described with an emphasis on their preliminary success in simulating at least one phase of photosynthesis.

AUTHOR: None

ORG: Welding Research Laboratory, Shanghai Communication University

TITLE: "Underwater Cutting"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 6, Jun 78  
p 17

ABSTRACT: Various underwater cutting techniques from the earliest method using oxygen-acetylene or oxygen-hydrogen gas torch to a more recent method using electro-oxygen torch are briefly reviewed. The newest method that is developed in the seventies and known as the melting pole, water ject, electric arc cutting method is described in detail with a sketch illustrating the principle of operation that the cutter works like an "electric arc saw." With this new method, a steel plate of 20 millimeters thick can be cut at the rate of 20-30 meters/hour in the deep water. Some of the advantages of this new cutting method are: 1) Thick plate can be cut with ease; 2) Any kind of metal plate can be cut, including stainless steel, copper, aluminum and its alloys; 3) High efficiency: its cutting speed is more than ten times that of electro-oxygen cutting method; 4) Low working electric voltage (60 volts without load, 25-45 volts with load) insures safety; 5) Commercially available galvanized steel wire can be used as the cutting wire and so low in cost.

AUTHOR: CH'EN En-chiu [7115 1869 0036]  
LIU You-ch'un [2692 0642 2504]

ORG: None

TITLE: "Gigantic Engineering of Artificial Weather Modification"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 6, Jun 78  
pp 20-21

ABSTRACT: The three major factors that control the weather are solar radiation, atmospheric circulation, and the surface conditions. Modification of the first two factors is too difficult, but modification of the last factor is relatively easy and some significant result can be expected. Some of the ideas that have been proposed concerning modification of the earth's surface conditions in order to achieve alteration of the weather pattern of certain specific areas are described. The specific ideas discussed include the followings: 1) Filling the Tartars Strait; 2) Damming the Bering Strait; 3) Creation of "Chad Sea" in Africa; 4) Expansion of Lake Eyre in Australia; and 5) Qattara Depression water reservoir project in Egypt.

AUTHOR: WANG Chien-kang [3769 0256 0474]

ORG: None

TITLE: "Large Scale Electric Power Generation Using Solar Energy -- One of the Major Energy Sources of the 21st Century"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 6, Jun 78  
pp 22-23

ABSTRACT: The principle of operation and some actual examples of electric power generating plant using solar energy are described. Included are examples of the earth-bound solar energy electric power station, the space-borne solar energy electric power station and the ocean solar energy electric power station with sketches illustrating the concept.

AUTHOR: WU Ch'eng-ch'i [6762 1004 3825]

ORG: None

TITLE: "Rolling Loading Ship -- A New Type of Cargo Ship"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 6, Jun 78  
pp 24-25

ABSTRACT: Rolling loading ships are a new type of cargo ships especially designed for the transportation of box cars developed toward the end of the sixties. Loading and unloading of this new type of cargo ship are done by towing the box cars in and out of the ship's hold without using cranes. The design concept of the rolling loading ship came directly from the military landing crafts of World War II. Their characteristics include tall and wide structure, side propellers at the bow and stern, huge stepping board, special loading-unloading vehicles, and special hold arrangement.

AUTHOR: CH'EN Ping-huei [7115 3521 6311]

ORG: None

TITLE: "Cruise Missile"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 6, Jun 78  
pp 26-27

ABSTRACT: The article begins with a brief review of the historical development of missiles from the German V-1 to the modern cruise missile and enters into a general discussion of the air launched and sea launched cruise missiles and their guidance systems including both the inertial and terrain matching guidance systems. It concludes with a brief description of the future trend of the cruise missile as well as anti-cruise missile measures.

AUTHOR: CHANG T'ien [1728 1131]  
CHAO Shan-hsiang [6392 0810 4382]

ORG: None

TITLE: "Vapor Movement Theory and Summer Treatment of Winter Diseases"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 6, Jun 78  
pp 38-39

ABSTRACT: The vapor movement theory is an old Chinese traditional medical theory in which diseases and changes in weather are considered to be closely related. This old theory has been rediscovered and by combining force with modern medical techniques it has been applied to the treatment as well as prevention of diseases. According to this theory, summer months are the best time for treatment of various winter diseases that are caused mainly by the chilliness such as coughing, rheumatic arthritis, bronchitis, etc. Sample prescriptions for warm compress and the method of application are explained with a diagram indicating the points of application and some clinical statistics supporting the effectiveness of such compress are also included. Other treatment methods such as needle therapy and moxa cautery are also explained with drawing illustrating the application of "moxibustion" and "warm needle." A sample prescription for treatment of colonitis is also given and a clinical case is cited in support of its effectiveness.

AUTHOR: None

ORG: None

TITLE: "Technical Brief"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 6, Jun 78  
pp 13-16

ABSTRACT: 1) Fabric dispensing computer, designed and manufactured by the workers of the Shanghai First Department Store, is capable of measuring, cutting, and folding cotton cloth and also calculating its price.

2) An accounting machine for a group of automatic vending machines using MOS integrated circuit of CP1000 series has been successfully trial produced by the technical group of Shanghai Yang-p'u District Tobacco and Sugar Co. with the help of the electronics group. The machine consists of a storage unit, a deciphering unit, and a distribution unit. It is capable of handling a maximum of 24 vending machines, continuously monitoring the state of affairs concerning the sale and stock of each vending machine and displaying the total amount of sale of each machine with 7 digits numeral display. It is also capable of detecting the trouble that may develop in any vending machine and executing appropriate measures to eliminate the trouble.

[continuation of K'O-HSUEH HUA-PAO No 6, Jun 78 pp 13-16]

3) Any numerically controlled Chinese medicine prescription preparer has been trial produced by the workers of the Shanghai Hu-wan Pharmaceutical Co. It utilizes the electronic technology of numbering by means of transistor circuits. It is capable of automatically preparing prescriptions from a group of 240 most common Chinese medicines at an average rate of five prescriptions per minute which amounts to approximately five times faster than that prepared by hand.

4) A rotary Chinese medicine brewing machine has been successfully manufactured by the Shanghai K'ang-ta Drug Store. It utilizes the jet flow technology and is capable of automatically carrying out the following operations: brewing, blending, compressing, pouring, adding water and rinsing. It is capable of brewing 120 prescriptions per hour while maintaining a high quality of the brews.

5) Radar responder--a new navigational equipment may be installed on a light ship, a buoy, an islet, a rock, a peak, or a building in water or on bank. It works in conjunction with the radar equipment on board ship to aid in its position fixing and navigation. For example, the red and white buoys and the ordinary radar become ineffective as navigational guide in a heavy traffic on a heavily foggy day. By installing radar responders on the red and white buoys, each with a different radar signal code, the responses from them can be easily

[continuation of K'O-HSUEH HUA-PAO No 6, Jun 78 pp 13-16]

discriminated on the radar fluoroscope and navigation on a foggy day can be made safer. In addition to the application mentioned above, radar responder is also useful for navigation through a narrow passage or maneuvering ship within the harbor.

6) An automatic coal briquette dispenser has been successfully trial produced by the workers of the Shanghai Sheng-li Coal Co. It is controlled by means of transistor electronics and is capable of automatically dispensing premeasured amount of coal briquettes according to the size of token that is inserted into the machine and also adding up the total sales.

7) An electronic anemometer has been successfully trial produced by the Yangchou Radio Parts No 8 Plant. It uses an advanced PMOS medium size integrated circuit and thus accomplishing the three goals of electrification, miniaturization, and digitization of anemometer. It is capable of measuring instantaneous wind velocity (within 1.5 seconds) as well as the average wind velocity over a period of 2 minutes. It operates on both AC and DC and, with a cable attachment, measures the wind velocity at a distance of from 20 to 100 meters.

[continuation of K'O-HSUEH HUA-PAO No 6, Jun 78 pp 13-16]

8) A continuous vacuuming and nitrogen-filling packaging machine has been successfully manufactured by the Shanghai Chinese Medicine 1st Plant with the help of the Shanghai Electric Power Tool Research Institute. It is used to package small pills in the plastic bags. The seven-step processes--feeding raw material, vacuum lifting bag, opening bag, filling bag, drawing air, filling nitrogen, and sealing bag--are controlled both mechanically and electrically. The operation was found to be simple and the yield four times that of the manual operation.

9) The compact sound level meter shown in the picture is small in size and weight and so is highly portable. It can register sound levels ranging from 35 to 130 db (decibels) and frequencies ranging from 30 to 8,000 Hz (Hertz). There are three, A, B and C, scales and two, fast and slow, settings. It is even equipped with an output jack from which the signal may be tapped for recording. This Model PST-1 compact sound level meter is the proud product of the combined effort by the Audio Research Laboratory of Shanghai T'ong-chi University and the Shanghai Feng-luei Broadcasting Equipment Factory. It has been put on a small scale production by the said factory.

AUTHOR: None

ORG: None

TITLE: "March Toward Modernization of Science and Technology"

SOURCE: Shanghai K'O-HSUEH HUA-PAO [SCIENCE PICTORIAL] in Chinese No 6, Jun 78  
Inside front and back covers

ABSTRACT: Inside front cover: 1) The famous mathematician Hua Lo-keng [5478 5012 1649] recently visited the Wei-wu-erh Autonomous District in Sinkiang, carrying out investigation and study deep into schools and scientific research units of the factories in order to popularize the method of selecting the exceptional.

2) Professor of mathematics Su Pu-ch'ing [5685 2975 7230] (front center) of the Shanghai Fudan University spent the last several years deep in a shipyard to carry out "mathematical patterning" and achieved a result considered to be up to the world's advanced level concerning "ship's bow linear pattern smoothing."

3) A researcher Ch'en Ching-jen [7115 2529 3387] of the Mathematics Research Institute of Chinese Academy of Sciences, burried his head and worked steadily

[continuation of K'O-HSUEH HUA-PAO No 6, Jun 78 Inside front and back covers]

for more than 20 years on research work concerning the number theory, especially the problem of "Gutbach conjecture," has recently obtained a result that leads the world.

4) Young mathematicians Yang Lo [2799 2867] (center) and Chang Kuang-hou [1728 1684 0624] (right), associate researchers of the Mathematics Institute of Chinese Academy of Sciences, are the first in the entire world to discover a concrete relationship between the two major concepts of the functional value distribution -- "亏值和奇数方向," a result considered to be up to the world's advanced

level. The picture shows these two young mathematicians conferring with Prof Chung Ch'i-t'ai [5445 0967 3141] about their joint work.

5) American physicist Dr Wu Chien-hsiung [0702 0256 7160] (front left) and Dr Yang Chia-liu [5913 1367 7511] (first from right) visiting the High Energy Physics Institute of Chinese Academy of Sciences accompanied by the director of the institute Chang Wen-yu [1728 2429 5940].

Inside back cover: 1) A famous biologist T'ing Ti-chou [4547 4574 0719] (second from left) of the Peking Zoological Institute of Chinese Academy of Sciences continuously making progress in his research work concerning the relationship between cell nucleus and cytoplasm and heredity.

[continuation of K'O-HSUEH HUA-PAO No 6, Jun 78 Inside front and back covers]

2) Professor T'ang Ao-ch'ing [0781 2407 1987] of the Chemistry Department, Kirin University is shown delivering a scientific report concerning the theory of molecular orbit diagram at the First National Quantum Chemistry Conference.

3) A famous expert on fracture mechanics of this country, Ch'en Ch'ih [7115 4654] (second from right), who is also the director of the Metallurgical Physics Laboratory of the Steel Institute, has contributed significantly to the development of high temperature alloys and understanding of their fracture mechanism over the past 20 years.

4) Pao Wen-k'uei [7637 2429 1145] (center) of the Crop Research Laboratory, Peking Agricultural Institute has worked closely with the scientific technical peoples as well as the workers in developing an improved species of black wheat and contributed significantly to the agriculture of this country.

5) An associate researcher Ch'en Jen-fu [7115 0088 3940] of the Shanghai Haunting Computer Technology Institute, who worked his way up to his present position from a worker, worked continuously and steadily for more than 10 years in the field of developing high speed electronic computers and made a significant contribution.

9113

CSO: 4009

ACTA ZOOLOGICA SINICA

AUTHOR: WU Cheng-an [0702 2398 1344]

ORG: Department of Cell Biology, Institute of Zoology, Chinese Academy of Sciences

TITLE: "Cultivation of Tissues and Cells from Amphibia"\*

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese Vol 24 No 2, Jun 78 pp 107-116

EXCERPT FROM ENGLISH ABSTRACT: 1. Altogether 13 kinds of tissues were isolated from the tongue, urinary bladder, pericardial membrane, lung, etc., of the common toad (Bufo bufo gargarizans) and cultivated, with tongue of frog (Rana plancyi) used for comparison. Observations were made on cell growth and multiplication as well as on other behavior.

2. Then the toad kidney and lung tissues as well as frog kidney tissue were selected for monolayer cell cultivation. It was demonstrated that the two commonly used culture media (GLPY and modified Eagle medium) and the method for monolayer cell culture could be well adapted for amphibian cell culture.

3. To isolate cells from explants for cultivation, the writer found that the use of 0.5% trypsin mixed with 0.01% EDTA and incubated at  $25 \pm 1^{\circ}\text{C}$  for a short period

[continuation of TUNG-WU HSUEH-PAO Vol 24 No 2, Jun 78 pp 107-116]

of digestion proved to be more satisfactory as compared with the methods used by earlier workers. This new method may be considered as a definite improvement.

\* Professor LI Ju-ch'i [2621 3067 4388] of the Department of Biology, Peking University, and Professor CH'EN Yueh-tseng [7115 7048 1073] aided by directing and reviewing the present work.



AUTHOR: WU Cheng-an [0702 2398 1344]

ORG: Department of Cell Biology, Institute of Zoology, Chinese Academy of Sciences

TITLE: "Chromosomal Studies on Cultured Amphibian Somatic Cells In Vitro"\*

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese Vol 24 No 2, Jun 78 pp 117-126

EXCERPT FROM ENGLISH ABSTRACT: 1. The present report consists of the karyotype analysis of cultured amphibian somatic cells in vitro and the comparison of different cells from various tissues with regard to their karyotypes.

2. The chromosomes of the cells from the tongue, kidney and lung tissues of the common toad (Bufo bufo gargarizans) were studied. They were found to possess the diploid chromosome number of 22 ( $2n = 22$ ), i.e. 12 large and 10 small chromosomes. The large chromosomes were matched into 6 homologous pairs and the small chromosomes were matched into 5 homologous pairs. All were metacentric and submetacentric. According to the size, shape and position of the centromere, the 22 chromosomes were tentatively classified into 4 groups: Group 1-2, Group 3-6, Group 7-10 and Group 11. The chromosome pair 6 can be identified unequivocally by direct observation for the small satellites on the long arms. Sexual dimorphism of the chromosomes was not detected in somatic karyotype of male and female common toads.

[continuation of TUNG-WU HSUEH-PAO Vol 24 No 2, Jun 78 pp 117-126]

3. From the phenomenon of satellite association and the other behavior, it was concluded that the No 6 chromosome is the nucleolus organizer in the common toad cells.

\* Professor LI Ju-ch'i [2621 3067 4388] of the Department of Biology, Peking University, and Professor CH'EN Yueh-tseng [7115 7048 1073] aided by directing and reviewing the present work.

AUTHOR: CH'EN I-feng [7115 1355 1496]  
LO Li-hua [5012 7787 5478]  
SHAN Hsiang-nien [0830 4382 1628]  
TS'AO Hsiao-mei [2580 4607 2734]

ORG: All of the Kunming Institute of Zoology, Chinese Academy of Sciences

TITLE: "The Karyotype of the Golden Monkey (Rhinopithecus r. roxellanae)"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese Vol 24 No 2, Jun 78 pp 127-135

TEXT OF ENGLISH ABSTRACT: In this study, the karyotype and Giemsa banding pattern of the chromosomes of cultured peripheral blood lymphocytes in R. r. roxellanae were investigated. The chromosome number of this species is 44 in both sexes. In R. r. roxellanae, as in other monkeys, sex is determined by specific sex chromosomes, i.e. the male is XY and the female is XX. The 21 pairs of autosomes consist of 7 pairs of metacentric chromosomes, 13 pairs of submetacentric ones, and 1 pair of acrocentric ones. Chromosome measurements were made from highly enlarged photographic prints. Table II lists the results obtained, including the relative length, arm ratio and centromere index of each chromosome. Both chromosomal and chromatid aberrations were observed. They are 0.67% and 2% respectively. Finally, Giemsa banding pattern analysis of chromosomes of R. r. roxellanae was

[continuation of TUNG-WU HSUEH-PAO Vol 24 No 2, Jun 78 pp 127-135]

carried out. The results show that each homologous pair has its own special banding pattern, so that each of them is easily recognizable. Idiograms of chromosome complements with the Giemsa banding pattern were constructed.

AUTHOR: None

ORG: Acupuncture Anesthesia Research Group, Department of Biology, Nanking University

TITLE: "The Role of Brain Ammonia in Electro-Analgesia"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese Vol 24 No 2, Jun 78 pp 136-142

TEXT OF ENGLISH ABSTRACT: Based upon the results of our previous experiments, it has already been demonstrated that in the course of electro-acupuncture, the ammonia contents both in the cortex and thalamus of the "positively-analgesic" animals decrease, while those of the "negatively-analgesic" animals increase. Such changes are characteristic of electro-acupuncture. It is therefore assumed that both the regions of the cortex and thalamus play a definite role in the processes of acupuncture analgesia.

The purpose of the present study is to further observe the reactions which brain ammonia have on the pain threshold of "positively- or negatively-analgesic" mice when they are intraperitoneally injected with ammonium chloride or sodium L-glutamate. The results indicate that between the ammonia contents and pain threshold there exist the following interrelations: (1) during electro-acupuncture, the

[continuation of TUNG-WU HSUEH-PAO Vol 24 No 2, Jun 78 pp 136-142]

pain threshold increases while the ammonia contents of both regions of the cortex and thalamus decrease, and vice versa; (2) sodium L-glutamate not only apparently increases the pain threshold, but also induces a strong effect of electro-acupuncture analgesia.

The present paper also discusses the role of brain ammonia and glutamic acid, and the metabolic processes of glutamic acid during electro-acupuncture analgesia as well.

AUTHOR: YU Tsung-han [0060 1350 3466]

ORG: Shanghai Institute of Physiology, Chinese Academy of Sciences

TITLE: "Effects of Some Violent Stimuli on Brain Lactic Acid"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese Vol 24 No 2, Jun 78 pp 143-149

EXCERPT FROM ENGLISH ABSTRACT: In order to avoid post-mortem changes, the author proposed to fix the rat or mouse brain in situ with freon ( $-158^{\circ}\text{C}$ ), liquid oxygen ( $-183^{\circ}\text{C}$ ) or liquid nitrogen ( $-195^{\circ}\text{C}$ ). We had found that a mixture of dry ice and acetone ( $-78^{\circ}\text{C}$ ) was a serviceable substitute for liquid oxygen, at least for the purposes of ammonia and lactic acid (LA) analyses. It is not necessary to pursue the lower temperature excessively.

The LA concentrations of different parts of the rat brain were determined after rapid freezing of the whole animal in the dry ice-acetone coolant. Because the freezing was slower in the deeper regions of the brain than in the superficial cortical layer, the higher LA level in the deeper parts of the brain, such as the brainstem, might be the autolytic artifact. We could not be sure of it. But there was no difference in the progression of the freezing front between vermis

[continuation of TUNG-WU HSUEH-PAO Vol 24 No 2, Jun 78 pp 143-149]

cerebelli and hemisphaerium cerebelli, so that the different LA concentrations of these two parts were indeed intrinsic. The LA was higher in the former than in the latter in each individual without exception.

AUTHOR: LO Fu-sun [5012 5397 5549]  
YUAN Chun-su [5913 6874 5685]  
YANG Shan-lu [2799 0810 3873]  
CHANG Chi-kuo [1728 7139 0948]\*  
CHANG Hsiang-t'ung [1728 7449 2717]

ORG: All of the Shanghai Institute of Physiology, Chinese Academy of Sciences

TITLE: "A Modified Stereotaxic Method for Brain Localization in Cats"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese Vol 24 No 2, Jun 78 pp 151-156

EXCERPT FROM ENGLISH ABSTRACT: A modified stereotaxic method for localization of the cat brain is described. In the method the superficial landmarks of the skull rather than the external auditory meatus are used as reference points in establishing the three dimensional coordinate systems. This method is especially suitable for experimental studies of audition and acupuncture analgesia, because it may leave the ear drums intact and cause no tympanic pain.

The essential proposition of this method is to determine the spatial relationship of three points B, P and O on the vertex of the skull which are taken as being projected on an hypothetical top plane parallel with the horizontal basal plane

[continuation of TUNG-WU HSUEH-PAO Vol 24 No 2, Jun 78 pp 151-156]

extending through the external auditory meatus and the inferior orbital ridges. The three reference points are point B (Bregma) where the coronal and sagittal sutures meet, point P which is the junction of the posterior lambdoid suture and the sagittal crest, and point O which is the point on the sagittal suture perpendicular to the interaural line.

\* Visiting Research Fellow, Tientsin College of Medicine.

AUTHOR: None

ORG: Department of Parasitology, and Department of Medicine, Infectious Disease Division, Hupeh Medical College

TITLE: "Investigation on the Etiologic Agent of Paragonimiasis in Hupeh Province"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese Vol 24 No 2, Jun 78 pp 179-186

EXCERPT FROM ENGLISH ABSTRACT: Maxwell (1931) mentioned a case of paragonimiasis from the vicinity of I-ch'ang. Thereafter many authors included Hupeh province as an endemic area of paragonimiasis (Ch'en, 1964, and others). In June, 1964, a patient from Hsing-shan was admitted to our teaching hospital. An immature Paragonimus worm was found in a subcutaneous nodule of the patient. A survey of the said area and vicinity showed that Potamon crabs in Hsing-shan harbored Paragonimus metacercariae. The infected rate of the crabs in Hsing-shan was 3.3-8.2%, while in I-ch'ang only 2 metacercarial cysts were found among 242 crabs examined. Altogether three types of metacercarial cysts were found: the large type (average size  $446.03 \times 440.4\mu$ ), the small type ( $284 \times 284\mu$ ) and the single-walled type metacercariae ( $475.4 \times 419.7\mu$ ). The large type was predominant. Of the 35 adult lung flukes obtained from the lungs of cats after being fed with

[continuation of TUNG-WU HSUEH-PAO Vol 24 No 2, Jun 78 pp 179-186]

metacercariae of the large type, 33 were identified as Paquimogonimus skrjabini (Chen, 1959) and 2 were undetermined. The smaller metacercariae provided with a thicker wall are probably P. westermani. The identification of the single-walled metacercarial cyst required further study.

AUTHOR: CHANG Jung-tsu [1728 2837 4371]  
CHAO K'en-t'ang [6392 5146 1016]

ORG: CHANG of the Institute of Geography, Chinese Academy of Sciences; CHAO of the Department of Biology, University of Inner Mongolia

TITLE: "On the Zoogeographical Regions of China"

SOURCE: Peking TUNG-WU HSUEH-PAO [ACTA ZOOLOGICA SINICA] in Chinese Vol 24 No 2, Jun 78 pp 196-202

TEXT OF ENGLISH ABSTRACT: Intending to revise The Zoogeographical Regions of China (1959) written by Cheng Tso-hsin [6774 0155 2450] and Chang Jung-tsu, the present paper suggests the following modifications:

1. The southern slopes below subalpine coniferous forest zone of the Himalayas, with such typical species as Presbytis entellus, Traopon satyra, Lophophorus impejanus, Bufo himalayna, etc., may be considered a new subregion of the South-west Region and called the Himalayan Subregion.
2. The northeast plain of China (flood plain of the Sungari and Liao rivers) with its western boundary adjacent to the Mongolian Plateau, characterized by a predominance of humid area species, such as Capreolus capreolus, Microtus maximowiczii, Garrulus glandarius, Cyanopica cyana, Rana amurensis, etc., may be considered a new subregion of the Northeast Region.

[continuation of TUNG-WU HSUEH-PAO Vol 24 No 2, Jun 78 pp 196-202]

3. The islands of the South China Sea, including Tung-sha, Hsi-sha, Tsung-sha and Nan-sha islands, inhabited by sea turtles and sea birds, may be considered as a whole new subregion of the South China Region.

The boundaries of the zoogeographical realms and regions are revised in certain sections. The problem of the position of the Great Hsing-an Mountains in the zoogeographical divisional system is discussed.

8650

CSO: 4009

- END -