

CONTENTS

Number 1, January–April 1969

✓ The optimum size of research groups for maximum effectiveness. Part I.—Statistical formulation and analysis of the data for U.K., Canada and Pakistan M.M. QURASHI	1
✓ Singlet states of molecular oxygen and cycloaddition mechanism in oxygenation of linoleate system N.A. KHAN	8
✓ The IR and UV spectra of some arylodonium and related compounds M. ARSHAD A. BEG and Y.Z. ABBASI	12
✓ The effective electronegativity of molecules: Correlation with C—H and M—CH ₃ frequencies M. ARSHAD A. BEG	16
✓ Phosphine adducts of polynitroaryls M. ARSHAD A. BEG and M.S. SIDDIQUI	19
✓ A new synthesis of (±)-norcoralydine I.H. SIDDIQUI and A.M. AHSAN	22
✓ An examination of space group of 2,4,6-trimethyl biphenyl sulphone by intensity statistics S.A. CHAUDHURY, M.A. HAMID and Sk. BADRUZZAMAN	24
✓ Viscosity dependence of di-t-butyl peroxide quenching efficiency for triplet naphthalene S.A.K. LODHI and G.R. MOGHAL	27
✓ Transistor characteristics curve tracer M.A. HAMADANI and MOHAMMAD RAFIQ	31
✓ A study of analcime mineral in some soils of West Pakistan M.S. HUSSAIN and S. AHMED	34
✓ Studies in production of calcium gluconate using locally isolated strains of <i>Aspergillus niger</i> M. YASIN, A. HAMEED NIAZI and M.A. QADEER	37
✓ Nutritional properties of sesame seed protein concentrate prepared from commercial sesame seed cake IFTIKHAR ALI SHAIKH, M. ARSHAD, M.Y.I. HAQ and S. MAQSOOD ALI	41
✓ Carotenoid content of some green plants MAHMOOD AHMAD SHAH, A. KABIR QURESHI and MANZOOR ELAHI	43
✓ Effect of ferrocyanide on citric acid production from beet molasses by <i>Aspergillus niger</i> M.A. QADEER, M. YASIN and M.A. BAIG	47
✓ Studies on blanched water—a waste product of the shrimp canning industry S. ABDUL HAQ, IQBAL H. SIDDIQUI and A. HAMEED KHAN	49
✓ Studies on the crimp form of different types of wool MUMTAZ AHMAD KHAN	52
✓ Beneficiation of Thana Bullah Khan and Jangshahi sand for glass-making MOHAMMAD RAFIQUE, GHULAM RASUL and M.A. RANA	58
✓ Studies on an indigenous fire clay for the manufacture of glass tank blocks M. ASLAM CHAUDHARY, GHULAM RASUL and M.A. RANA	62
✓ Ceramic colours. Part II.—Pink stains F.A. FARUQI, M.A. BEG, M. YUSUF and M. AYUB	67
✓ Toxicity of Petkolin against cattle tick, <i>Boophilus decoloratus</i> Koch (Acarina: Ixodidae) M. ANWARULLAH and (Miss) SHAMEEM SAEED QURESHI	70
✓ Laboratory evaluation of indigenous insecticides as compared with other insecticides against the larvae of <i>Aedes aegypti</i> (L.) SHAHID H. ASHRAFI, ISHTIAQ A. KHAN and A.R. BHATTI	74

Bacterial and fungal isolates from laboratory-reared <i>Aedes aegypti</i> (Linnaeus), <i>Musca domestica</i> (Linnaeus) and <i>Periplaneta americana</i> (Linnaeus)	
RIAZ I. ZUBERI, SAYADA HAFIZ and S.H. ASHRAFI	77
Studies on the nutrition of fungi—effect of various combinations of monosaccharides on the growth of five different fungi	
(Miss) KHADIJA ZAMIR and SYED SHAHID HUSSAIN	83
Phosphomonoesterases in different tissues of the desert locust, <i>Schistocerca gregaria</i> (Forsk.)	
S.H. ASHRAFI, S.N.H. NAQVI, S.A. MUZAFFAR and S.A. QURESHI	86
The brachyuran larvae of West Pakistan hatched in the laboratory. Part I.—Oxystomata, Calappidae (Decapoda: Crustacea)	
SYED SALAHUDDIN HASHMI	90
A key to the Pakistani genera and species of the Hispinae and Cassidinae (Coleoptera: Chrysomelidae), with description of a new species from West Pakistan including the economic importance	
MOHAMMAD ABDULLAH and (Miss) SHAMEEM SAEED QURESHI	95
A key to the Pakistani genera and species of the Chrysomelinae and Halticinae (Coleoptera: Chrysomelidae), with description of new genera and species including the economic importance	
MOHAMMAD ABDULLAH and (Miss) SHAMEEM SAEED QURESHI	105
The cockchafer and dung-rollers of Pakistan of the Desmoryninae, Euchirinae and Rutelinae (Peltonotini, Parastasiini and Adorrhinyptiini) along with the description of five new species of <i>Anomala</i> (Coleoptera: Scarabaeidae)	
MOHAMMAD ABDULLAH and (Miss) ROSHAN ARA ROOHI	121
Biology and control of the insect pests of cucurbits of the Indo-Pakistan subcontinent	
MOHAMMAD ABDULLAH	127
Mutagenic effects of the monofunctional ethylation and methylation reactions in <i>Drosophila</i>	
A.H. KHAN	149
Short Communications:	
A contribution to the pharmacognostic study of the fruit of <i>Schinus molle</i> L.	
A.H. SIDDIQUI and S.I.H. SHAH	153
The heats of adsorption of organic vapours on carbon black—methyl acetate, methyl formate, acetaldehyde, methanol, methyl cyanide, methyl ethyl ketone	
M. AFZAL and N. SINGER	154
X-ray data of harmidine	
DABIR AHMED and S.S.H. RIZVI	157
The reaction of dibromocarbene with <i>N</i> -methylaniline	
S.D. SARAF	158
Special studies on alkaloids. Part III.—The identification of berbeninine as berbamine	
G.A. MIANA, M. IKRAM and S.A. WARSİ	159
Alkaloids of <i>Sarcococca saligna</i> Muel: salignaine	
G.A. MIANA and M. KIAMUDDIN	161
Mineralogy of asbestos from Kurram agency	
M.A. QAISER and A.H. KHAN	163
Two new generic chromosome records	
S.R. BAQUAR	164
The inhibition in respiratory rate of bananas by ethylene	
M.H. QUAZI and H.T. FREEBAIRN	165
Report on the occurrence of blast of rice in south West Pakistan	
SHAKIL AHMAD KHAN and M. KAMAL	166
The sub-species of <i>Polydorus aristolochiae</i> (Fabr), papilionidae	
G.H. MUNSHI and S.A. MOIZ	167
Book Notices	168

PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

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Pakistan J. Sci. Ind. Res., 12, 1-7 (1969)

THE OPTIMUM SIZE OF RESEARCH GROUPS FOR MAXIMUM EFFECTIVENESS

Part I.—Statistical Formulation and Analysis of the Data for U.K., Canada and Pakistan

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A statistical analysis is presented of the size distribution of laboratories and units of various major research organizations in three countries, *viz.* U.K., Canada, and Pakistan, using the concept of Density of Scientific Effort, defined in terms of the numbers, N , of the scientific officer class in various size-intervals. The individual distributions have somewhat varying shapes, and it is found that the mean data for agriculture research yield an excellent curve with a single maximum at $N=28\pm1$ scientific officers per institute and a half-value width of 45 ± 2 . The data for industrial research, when averaged, give a distribution with the main peak at $N=69\pm1$ and a subsidiary maximum at 28 ± 2 scientific officers per institute or laboratory.

This bimodal distribution can be decomposed into two distributions, one of which is identical with that for agriculture research, while the other one is very different in nature, coming down to half-value at 52 and 95 scientific officers per laboratory or institute. All the individual distribution curves (including that for defence research establishments) are found to be made up of various proportions of these two basic distributions. It is concluded that the optimum number of scientific officers, N_{opt} for research institutes is given by $28 \leq N_{opt} \leq 69$.

Pakistan J. Sci. Ind. Res., 12, 8-11 (1969)

SINGLET STATES OF MOLECULAR OXYGEN AND CYCLOADDITION MECHANISM IN OXYGENATION OF LINOLEATE SYSTEM

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Initial oxygenation and formation of hydroperoxide only without decomposition, have been shown to be the actual process. The experimentations by singlet molecular oxygen from chemical source and chlorophyll sensitization compared to those of general oxygenation by visible light catalysis and lipoxidase catalysis, has brought out ample clues to possible mechanisms. The transitional cycloaddition by virtue of π -complexes earlier proposed by us has been shown to be the possible mechanism of oxygenation by active species of molecular oxygen towards formation of hydroperoxides as the independent step ahead of main autoxidation reactions. The *cis* attack keeping activated O_2 -molecule and participating $-CH$ in a plane perpendicular to olefinic centre, has been shown to be in the theories already proposed.¹⁹⁻²³ The stereospecificity evident from optical activity in products from both types (singlet and triplet states) under specific conditions, has established the fact that two types of singlet molecular oxygen are involved, one known as $^1\Delta_g$ (22.5 kcal) and the other still uncertain about energy levels (possibly below 22.5 kcal with lesser activity).

Pakistan J. Sci. Ind. Res., 12, 12-15 (1969)

THE IR AND UV SPECTRA OF SOME ARYLIODONIUM AND RELATED COMPOUNDS

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(Received July 9, 1968; revised August 29, 1968)

The IR and UV spectra of iodobenzene, benzene iododichloride, iodosobenzene, iodoxybenzene, diphenyl iodonium bromide and iodide and bis-*p*-tolylodonium bromide and iodide have been recorded. The intensities of the 1570, 1470 and 990 cm^{-1} bands have been correlated with the charge disturbance of the ring π electrons. In the case of *p*-tolylodonium compounds the 1590 cm^{-1} band absorbs only weakly which supports our earlier suggestion that this band is related to the interaction of the lone pair electrons with the ring π electrons. The neighbouring group effect is particularly obvious in iodoso and iodoxybenzene. From these studies the iodonium compounds have been shown to have an unsymmetrical orientation of the rings. The UV spectra indicate that the dissipation of the energy of the electronically activated state into vibrationally excited system is slightly hindered, suggesting an unsymmetrical inclination of the rings in the diaryliodonium compounds.

Pakistan J. Sci. Ind. Res., 12, 16-18 (1969)

THE EFFECTIVE ELECTRONEGATIVITY OF MOLECULES: CORRELATION WITH C—H AND M—CH₃ FREQUENCIES

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(Received July 22, 1968)

The effective electronegativity criterion has been further elaborated and shown to be valid in the case of the C—H and M—CH₃ stretching frequencies (M=elements of the third to seventh group). The deviations of the C—H stretching in methyl and methylene fluorides has been explained to be due to the reinforcement of the inductive component of fluorine by the hybridization dipole moment of the methyl. The CH₃—MCl₃ compounds of the fourth group elements have larger shifts compared with the methyls of the same elements which has been suggested to be a result of the change in the effective electronegativity.

PHOSPHINE ADDUCTS OF POLYNITROARYLS

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(Received July 9, 1968)

Phosphines form addition compounds with polynitro aromatic compounds like picric acid, 1,3,5-trinitrobenzene and 2,4-dinitrophenol. Picrates of the alkyl phosphines are obtained in good yield from stoichiometric amounts of picric acid and phosphines, viz. trimethylphosphine, tributylphosphine, phenyldimethylphosphine, triphenylphosphine and tri-*p*-tolylphosphine. The alkylphosphines react instantaneously at room temperature with the deposition of the intensely coloured compounds. Yellow solids which gradually transform into the deep coloured compounds are also obtained when the reaction is carried out at lower temperatures. With the arylphosphines an intermediate yellow solid is not obtained, the reaction is very slow and it is only on long refluxing that dark solid is obtained. Only the alkylphosphines react with the other nitroaryls. From the intensity of the colour and their reactions with acid and alkali the compounds are suggested to be zwitterionic in nature.

Pakistan J. Sci. Ind. Res., **12**, 22-23 (1969)

A NEW SYNTHESIS OF ($\pm$)-NORCORALYDINE

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(Received August 15, 1968)

The total synthesis of ($\pm$)-norcoralydine was accomplished by the decarboxylation of 2,3,10,11-tetramethoxy-12-carboxy-5,6,13,13a-tetrahydro-8*H*-dibenzo(a,g)quinolizine (12-carboxynorcoralydine) providing a synthetic proof to the siting of the methoxyls at the 10 and 11 positions of the dibenzoquinolizine nucleus.

Pakistan J. Sci. Ind. Res., 12, 24-26 (1969)

AN EXAMINATION OF SPACE GROUP OF 2,4,6-TRIMETHYL BIPHENYL SULPHONE BY INTENSITY STATISTICS

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(Received March 30, 1968; revised June 4, 1968)

The process of determining the space group of a substance from the knowledge of symmetrically and systematically absent reflexions only has been proved to be incomplete. It often fails to distinguish between space groups unambiguously and accurately. The method of intensity statistics has been proved to be the best one for distinguishing between space groups not resolved by systematic absences and it can be applied to any group of reflexions.

In the present investigation $N(z)$ test and moment tests have been tried out successfully on the complete three dimensional data of 2,4,6-trimethyl biphenyl sulphone in order to distinguish unambiguously and unequivocally between the two possible space groups $Pnma$ and $Pn2_1a$ of the compound which could not be done directly from the diffraction photographs. The space group came to be $Pnma$.

Pakistan J. Sci. Ind. Res., 12, 27-30 (1969)

VISCOSITY DEPENDENCE OF DI-t-BUTYL PEROXIDE QUENCHING EFFICIENCY FOR TRIPLET NAPHTHALENE

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(Received February 9, 1968; revised August 15, 1968)

Naphthalene triplet quenching by di-t-butyl peroxide at room temperature is not diffusion controlled. Bond dissociation energy of the peroxide is about 20 kcal less than triplet naphthalene, suggesting peroxide as efficient energy acceptor. The rate constant of triplet naphthalene quenching by di-t-butyl peroxide has been studied in propylene glycol as a function of viscosity. The ratio of $k_{\text{obs.}}/k_{\text{cal}}$, lies between 0.01-0.4, suggesting that quenching rates are slower than the diffusional rates. Contact charge-transfer mechanism for quenching of triplet naphthalene by peroxide is proposed which predicts that the rates of quenching will be slower than the encounter rates at all temperatures and viscosities.

Pakistan J. Sci. Ind. Res., 12, 31-33 (1969)

TRANSISTOR CHARACTERISTICS CURVE TRACER

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(Received May 20, 1968)

A mains-operated, reliable and inexpensive transistor characteristics curve tracer, has been designed for use in the laboratory. The instrument embodies a saw-tooth generator, staircase generator, different load and base resistances and a regulated power supply. The characteristic curves of PNP or NPN (silicon or germanium) transistor are displayed on an oscilloscope, when the instrument is connected to its horizontal and vertical amplifier.

A STUDY OF ANALCIME MINERAL IN SOME SOILS OF WEST PAKISTAN

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(Received April 6, 1968)

Three out of a total of nine soil samples from West Pakistan showed unusually high (more than 100) exchangeable sodium percentage (ESP) when determined according to the conventional methods. But the pH of these soils ranged from 7.0 to 7.6. This was regarded as an unusual result. It was suspected that the high ESP in the soils may be due to "zeolitic sodium" released from analcime mineral. An intensive mineralogical investigation showed that there is no analcime mineral present in these soils. The high ESP in the soils was therefore not caused by analcime mineral. Low pH values (7.0-7.6) might be regarded as the main obstacle in the way of the synthesis of analcime in the soils under study.

Pakistan J. Sci. Ind. Res., 12, 37-40 (1969)

STUDIES IN THE PRODUCTION OF CALCIUM GLUCONATE USING LOCALLY ISOLATED STRAINS OF ASPERGILLUS NIGER

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(Received August 16, 1967; revised July 23, 1968).

The locally isolated strains of *Aspergillus niger* gave better yields of calcium gluconate in submerged fermentation of glucose. Calcium gluconate fermentation reached maximum 96 and 120 hr after spore inoculation of crystalline and liquid glucose media, respectively. The rates of glucose utilisation and calcium gluconate formation decreased with the increase in the concentration of glucose (20, 25 and 30%). The addition of boron (0.28, 0.57 and 0.87%) as boric acid in the medium containing 20, 25 or 30% glucose, however, increased both the glucose utilisation and calcium gluconate formation.

Pakistan J. Sci. Ind. Res., 12, 41-42 (1969)

NUTRITIONAL PROPERTIES OF SESAME SEED PROTEIN CONCENTRATE PREPARED FROM COMMERCIAL SESAME SEED CAKE

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(Received April 17, 1968; revised July 10, 1968)

A protein concentrate containing 72% protein was prepared from commercial sesame seed cake. When supplemented with fish protein concentrate or skim milk powder so that equal quantity of proteins were derived from either sources, the net protein utilization and protein efficiency ratio were improved almost approaching to the level of animal protein used.

Pakistan J. Sci. Ind. Res., 12, 43-46 (1969)

CAROTENOID CONTENT OF SOME GREEN PLANTS

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(Received April 23, 1968; revised June 6, 1968)

Total carotenoid and carotene contents of thirty fresh green plants of different families have been determined. Some leguminous and graminous plants have been found to be the rich sources. Total carotenoid and carotene contents of leaves and stems of some leguminous plants have also been determined separately. The effect of blanching on some leguminous plants shows that it is not necessary from the enzymatic viewpoint if the extraction is to follow very soon after cutting. The spectra in petroleum ether of all plant extracts both before and after chromatography are similar and in the latter case these closely resemble with that of β -carotene. Vitamin A potency of all plants has also been calculated.

Pakistan J. Sci. Ind. Res., 12, 47-48 (1969)

EFFECT OF FERROCYANIDE ON CITRIC ACID PRODUCTION FROM BEET MOLASSES BY ASPERGILLUS NIGER

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(Received August 19, 1968)

Effect of ferrocyanide (0-200 ppm) was studied on the growth of *Aspergillus niger* and citric acid formation in the molasses medium. The growth of *Aspergillus niger* in the molasses medium was sensitive to ferrocyanide when added during the exponential growth phase. The mould growth was modified to the form of small, separate and round pellets with the result that both the agitation and aeration or oxygen supply to the cultures was increased. Ferrocyanide concentration of 30 ppm stimulated maximum citric acid formation.

Pakistan J. Sci. Ind. Res., 12, 49-51 (1969)

STUDIES ON BLANCHED WATER—A WASTE PRODUCT OF THE SHRIMP CANNING INDUSTRY

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(Received February 8, 1968)

The blanched water rejected by the local shrimp canning industries contain 16% protein and nearly 78% sodium chloride. It has been observed that during the blanching operations in the shrimp canning industry, the total leaching losses of protein, free amino acids, minerals and vitamins, range from 30,000–60,000 lb during an 8-hr shift, depending upon the size of the blanching vessel. Using dialysis in static water it is possible to recover 80% of the salt and to concentrate 60% of the proteinous matter which was otherwise going waste.

STUDIES ON THE CRIMP FORM OF DIFFERENT TYPES OF WOOL

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(Received April 27, 1968)

An attempt was made to investigate the relationship between crimp form and other crimp parameters, such as crimp frequency and amplitude, but no correlation was found. However, % length (% increase in length on straightening based on crimped length) gave highly significant partial regression coefficient on crimp form, crimp frequency and amplitude. Variations in crimp form are associated with differences in fleece density. In high density fleeces, the crimp configuration is planar, whereas in low density fleeces, the fibres have a helical form.

BENEFICIATION OF THANA BULLAH KHAN AND JANGSHAHI SAND FOR GLASS-MAKING

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(Received December 22, 1968)

In the Thana Bullah Khan and Jangshahi deposits, the main impurity is that of iron which is present in the form of heavier black particles and the yellow to reddish coating over the grains. These have been significantly reduced by washing the samples over shaking tables and afterwards by treating with sodium acid oxalate and ferrous sulphate solution (Adam's process). The processed sand is suitable for the manufacture of colourless glass.

STUDIES ON AN INDIGENOUS FIRE CLAY FOR THE MANUFACTURE OF GLASS TANK BLOCKS

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(Received July 24, 1968; revised September 19, 1968)

K.D. Fire Clay No. 1 from Mianwali district has been extensively studied. It has been shown that water washing considerably improves this kaolinite type plastic clay for use as a suitable raw material in the manufacture of glass tank blocks. Test bricks made from the washed clay containing 60% grog of the same material are comparable to the imported fire clay blocks. The test bricks contain 42-43% Al_2O_3 and 1.1% Fe_2O_3 . They show only 5% subsidence at 1575°C under a load of 2 kg/cm^2 and have a PCE value of 35. Their bulk density and porosity are 2.1 and 18-19% respectively.

Pakistan J. Sci. Ind. Res., 12, 67-69 (1969)

CERAMIC COLOURS

Part II.—Pink Stains

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The formation and application of chrome-alumina and chrome-tin pinks were studied. Various compositions were calcined at different temperatures from 1150° to 1350°C. The stains developing good colour were selected and tested in different glaze compositions. Some commercially exploitable stains alongwith suitable glazes were developed.

Pakistan J. Sci. Ind. Res., 12, 70-73 (1969)

TOXICITY OF PETKOLIN AGAINST CATTLE TICK, BOOPHILUS DECOLORATUS KOCH (ACARINA: IXODIDAE)

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(Received January 4, 1968; revised April 30, 1968)

Acaricidal action of Petkolin, a petroleum based chlorinated insecticide, has been studied against cattle tick, *Boophilus decoloratus* Koch. Results were compared with DDT, Endrin and BHC. It was found that Petkolin-M was more toxic than DDT, Endrin and BHC.

LABORATORY EVALUATION OF INDIGENOUS INSECTICIDES AS COMPARED WITH OTHER INSECTICIDES AGAINST THE LARVAE OF AEDES AEGYPTI(L.)

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(Received April 30, 1968)

Indigenous insecticides in comparison with other pesticides were evaluated in the laboratory against 4th instar larvae of *Aedes aegypti* (L.). Heptachlor was found most effective with LC_{50} 0.0025 ppm and LC_{90} 0.012 ppm. Among the indigenous insecticides Petkolin-S(1-B), Petkolin-S (2-B), Petkolin-S (3-B), Petkolin-A (2-B) and Petkolin-A (3-B) were found more toxic than Toxaphene while LC_{50} values of Petkolin-S (2-B) and (3-B) were approximately comparable with that of B. H. C.

Pakistan J. Sci. Ind. Res., 12, 77-82 (1969)

**BACTERIAL AND FUNGAL ISOLATES FROM LABORATORY-REARED AEDES AEGYPTI
(LINNAEUS), MUSCA DOMESTICA (LINNAEUS) AND PERIPLANETA AMERICANA
(LINNAEUS)**

RIAZ I. ZUBERI, SAYADA HAFIZ and S.H. ASHRAFI

P.C.S.I.R. Laboratories, Karachi 32

(Received April 1, 1968)

Eggs, larvae, pupae and adults of *Aedes aegypti* (Linnaeus), *Musca domestica* (Linnaeus) and *Periplaneta americana* (Linnaeus) were separately plated out on nutrient media for the isolation of the normal aerobic bacterial and fungal flora. Fifteen isolates from *Aedes aegypti*, 27 from *Musca domestica* and 15 isolates from *Periplaneta americana* were identified.

Pakistan J. Sci. Ind. Res., 12, 83-85 (1969)

STUDIES ON THE NUTRITION OF FUNGI

Effect of Various Combinations of Monosaccharides on the Growth of Five Different Fungi

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(Received May 31, 1968; revised July 25, 1968)

Effect of four monosaccharides, glucose, xylose, fructose and galactose and their different combinations, on the growth of *Helminthosporium nodulosum* (Berk. et Curt.) Sacc., *Curvularia verruculosa* Tandon et Bilgrami, *Aspergillus nidulans* (Eidam) Wint., *Phaeoramularia* sp. and *Paecilomyces varioti* Bain, was determined in liquid culture medium. It was observed that combination of these sugars yielded better growth than the individual sugars alone. It may be postulated that a certain sugar can be better utilized in the presence of another sugar or one sugar supplements the utilization of another sugar.

PHOSPHOMONOESTERASES IN DIFFERENT TISSUES OF THE DESERT LOCUST, *SCHISTOCERCA REGGARIA* (FORSKAL)

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(Received March 28, 1968; revised July 26, 1968)

Phosphomonoesterases were determined quantitatively in different tissues of desert locust according to the procedure of Naqvi *et. al.* Acid phosphatase activity was found to be high in Malpighian tubules (proximal and distal end both), caecae, midgut and male accessory glands. It was moderate in hindgut, spermatheca, oviduct, salivary glands, ovariole, blood, heart, testes, foregut, brain and low in male ducts, ova, fat bodies, nerve cord and integument. Activity was negligible in muscles and absent in tracheae.

Alkaline phosphatase activity was recorded high in male accessory glands, caecae, midgut, and salivary glands. The activity was moderate in foregut, testes, ovariole and low in blood, male ducts, hindgut, fat bodies, oviduct, Malpighian tubules (distal and proximal both), and spermatheca. It was negligible in brain and absent in ova, integument, muscles, heart, nerve cord, and tracheae. The results were compared with the histochemical findings of Qureshi³ for the same insect and were correlated with different physiological functions.

Pakistan J. Sci. Ind. Res., 12, 90-94 (1969)

THE BRACHYURAN LARVAE OF WEST PAKISTAN HATCHED IN THE LABORATORY

Part I.—Oxystomata, Calappidae (Decapod: Crustacea)

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(Received May 14, 1968)

Prezoea and first zoea of *Matuta lunaris* (Forsk.) and *M. planipes* (Fabricius) have been obtained by rearing the ovigerous females. These are figured and described. A comparative study of first zoeae of both the species has also been made.

Pakistan J. Sci. Ind. Res., 12, 95-104 (1969)

**A KEY TO THE PAKISTANI GENERA AND SPECIES OF THE HISPINAE AND CASSIDINAE
(COLEOPTERA: CHRYSOMELIDAE), WITH DESCRIPTION OF A NEW SPECIES FROM
WEST PAKISTAN INCLUDING THE ECONOMIC IMPORTANCE**

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(Received May 21, 1968)

Keys (with distinguishing characters) are provided for the genera and species of the Hispinae and the Cassidinae of West and East Pakistan. A new species (*H. yunusi* Abdullah & Qureshi) of *Hispa* Linnaeus, 1767 is described from West Pakistan. This is for the first time that the genus has been discovered in West Pakistan. The taxa treated in this paper are pests of economic importance.

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A. KEY TO THE PAKISTANI GENERA AND SPECIES OF THE CHRYSOMELINAE AND HALTICINAE (COLEOPTERA: CHRYSOMELIDAE), WITH DESCRIPTION OF NEW GENERA AND SPECIES INCLUDING THE ECONOMIC IMPORTANCE

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(Received May 21, 1968)

Keys (with distinguishing characters) are provided for the genera and species of the Chrysomelinae and the Halticinae (fleabeetles) of West and East Pakistan. information on their economic importance is also given. The following new taxa of the Chrysomelinae are described from West Pakistan: *Chrysolina kamali* sp. n.; *C. punjabiensis* sp. n.; *Neolycaria* gen n.; *N. ahmadi* sp. n.; *N. farooqi* sp. n.; *Anwarullahia* gen n.; *A. lahorensis* sp. n.; *A. nasiri* sp. n.; *Neopotonina* gen n.; and *N. hamidi* sp. n.

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**THE COCKCHAFERS AND DUNG-ROLLERS OF PAKISTAN OF THE DESMONYCINAE,
EUCHIRINAE AND RUTELINAE (PELTONOTINI, PARASTASIINI AND ADORRHINI-
NYPTIINI) ALONG WITH THE DESCRIPTION OF FIVE NEW SPECIES OF
ANOMALA (COLEOPTERA: SCARABAEIDAE).**

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Keys (with distinguishing characters) are presented for the identification of the genera and species of the Desmonycinae, Euchirinae and Rutelinae (Peltonotini, Parastasiini, and Adorrhinyptiini) of East and West Pakistan. Five new species of *Anomala* Samouelle (Anomalini, Rutelinae) are described from West Pakistan: *A. anwari* sp. n., *A. yunusi* sp. n., *A. akbari* s. n., *A. lyallpurensis* sp. n., and *A. ikrami* sp. n. A revised key to the nineteen West Pakistan species of *Anomala* is also included.

BIOLOGY AND CONTROL OF THE INSECT PESTS OF CUCURBITS OF THE INDO-PAKISTAN SUBCONTINENT

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Vine crops of the gourd family Cucurbitaceae are of economic, agricultural, industrial and medical importance. The cucurbit vegetables serve as alkali reserves of the blood, as source of minerals, as source of roughage, and as source of vitamins A, B, C and G. Some of them have such alkaloids as colocynthin, colocynthetin, bryonin, myriocarpin, momordicin, etc., and are used as a remedy for various diseases. Their seeds usually contain fats with linoleic, oleic, linolenic or conjugated polythenoid acids as major components. These plants are attacked by adult or immature stages of a number of insect pests, which are, alphabetically and order wise, followed by their known natural enemies in parentheses, as follows: I. Coleoptera or beetles and weevils: (1) *Acythopeus citrulli*—a curculionid; (2) *Apomecyna histrio*—a cerambycid; (3) *A. pertigera*—a cerambycid; (4) *Aulacophora atripennis* or black pumpkin beetle—a chrysomelid; (5) *A. foveicollis* or red pumpkin beetle—a chrysomelid (crows, mynas and a reduviid bug, *Rhinocoris fuscipes*); (6) *Epilachna* species or spotted lady bird beetles—a coccinellid, namely *E. chrysomelina*, *E. dodecastigma* (reduviid *Rhinocoris fuscipes*), *E. vigintiotopunctata* (*R. fuscipes*, *Pleurotropis foveolatus* and *Tetranychus ovularum*); and *Juliodis atkinsoni*—a buprestid. II. Diptera or true flies: (B) *Dacus brevistylus*—a trypetid (*Opius incisi*); (9) *D. cucurbitae* or melon fly—a trypetid (*O. fletcheri*, *Syntomus phyrum* and *Ipoobracon* sp.); (10) *Myiopardalis paradalina*—a trypetid. III. Hemiptera or plant bugs, etc.: (11) *Aspongopus brunneus*—a pentatomid; (12) *A. janus*—a pentatomid (*Eupelmus aspongoni*); (13) *Frankliniella sulphurea*—an aphid; (14) *Gallobellicus crassicornis*—a mirid; (15) *Leptoglossus membranceus* or paddle legged bug—a pentatomid; (16) *Megynemom brevicorne*—a pentatomid; (17) *Metacanthus pulchellus*—a berytid; and (18) *Nezara viridula*—a pentatomid (*Telenomus* sp., *Microphanurus* sp., *Sarcophaga sternodontis* and *Trichopoda pennipes*). IV. Lepidoptera or butterflies and moths: (19) *Agrotis ypsilon* or greasy surface caterpillar—a noctuid (*Microgaster* sp., *Amblyteles* sp. and *Fileanta rufocauda*); (20) *Laphygma exigua* or indigo caterpillar—a noctuid (*Sturmia inconspicuoides*, *Actia monticola*, *Euplectrus gopimohni*, *E. plecoptrae*, *Bracon hebetor*, myna bird, *Canthecona furcellata*, reduviid *Rhinocoris fuscipes* and *Ammophila* sp.); (21) *Margarona indica*—a pyralid (*Apanteles taragamae*); (22) *Pericallia ricini*—an arctiid (*Apanteles ricini*); (23) *Plusia peponis*—a noctuid (*Ceraphron athanassi*, *Apanteles plusia* and *A. taragamae*); (24) *Sphenurches caffer*—a pterophorid (*Apanteles paludicola* and *A. rangii*). V. Orthoptera or grasshoppers, locusts, crickets, etc.: (25) *Brachytrypes achatinus*—a gryllid (lizards and digger wasp *Sphex lobatus*); and (26) *Poeciloceris pictus*—an acridid. Their biology and control measures are described in this monograph.

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MUTAGENIC EFFECTS OF THE MONOFUNCTIONAL ETHYLATION AND METHYLATION REACTIONS IN *DROSOPHILA**

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The monofunctional alkylating agents, diethyl sulphate, ethyl methanesulphonate, and methyl methane-sulphonate, have been studied as mutagens on *Drosophila* spermatozoa when administered by the adult feeding method: all three compounds show pronounced mutagenic effects. A comparison has been made of the relative mutagenic effectiveness of the ethylation and methylation reactions on *Drosophila*.

SHORT COMMUNICATION

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A CONTRIBUTION TO THE PHARMACOGNOSTIC STUDY OF THE FRUIT OF SCHNIUS MOLLE L.

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THE HEATS OF ADSORPTION OF ORGANIC VAPOURS ON CARBON BLACK

Methyl Acetate, Methyl Formate, Acetaldehyde, Methanol, Methyl Cyanide, Methyl Ethyl Ketone

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X-RAY DATA OF HARMIDINE

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THE REACTION OF DIBROMOCARBENE WITH N-METHYLANILINE

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SPECTRAL STUDIES ON ALKALOIDS

Part III.*--The Identification of Berbenine as Berbamine

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ALKALOIDS OF SARCOCOCCA SALIGNA MUEL: SALIGNINE

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MINERALOGY OF ASBESTOS FROM KURRAM AGENCY

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TWO NEW GENERIC CHROMOSOME RECORDS

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THE INHIBITION IN RESPIRATORY RATE OF BANANAS BY ETHYLENE

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REPORT ON THE OCCURRENCE OF BLAST OF RICE IN SOUTH WEST PAKISTAN

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THE SUB-SPECIES OF POLYDORUS ARISTOLOCHIAE (FABR), PAPILIONIDAE

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