

**PANJAB
UNIVERSITY
RESEARCH
JOURNAL
(SCIENCE)**



VOL. 57, 2007

PANJAB UNIVERSITY RESEARCH JOURNAL (SCIENCE)
VOLUME 57

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The manuscripts for publication or any other enquiry is also to be addressed to the Editor-in-Chief.

Subscription fee:

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Annual Subscription:	Rs.400/-	US \$ 50
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FORM IV
(See rule 8)

1. Registration No. : ISSN-0555-7631
2. Place of Publication : Room No. 28-29,
Old Correspondence Building
Panjab University
Chandigarh - 160014 (India)
3. Periodicity of publication : Annual
4. **Publishers' & Editors' Name** :
- Editor-in-Chief : Professor Manmohan Gupta
- Nationality : Indian
- Editor : Professor R.K. Pathak
- Nationality : Indian
- Address : Research Journal (Science)
Room No.28-29,
Old Correspondence Building,
Panjab University
Chandigarh – 160 014
5. Printer's Name : Mr. Jatinder Moudgill
- Nationality : Indian
- Address : Manager
Panjab University Printing Press
Chandigarh - 160 014.
6. Name and Address of the individuals who:
own the newspaper and partners or
shareholders holding more than one per
cent of the total capital. : Panjab University, Chandigarh

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ABSTRACTS OF THE PAPERS APPEARED IN VOLUME 57 (2007)

THE FUNDAMENTAL CONSTANTS IN PHYSICS

H. Fritzsch

Universität München, Department für Physik, Munich, Germany

Abstract

We discuss the fundamental constants in the Standard Model of particle physics, in particular possible changes of these constants on the cosmological time scale. The Grand Unification of the observed strong, electromagnetic and weak interactions implies relations between time variations of the finestructure constant α and the QCD scale Λ_c . The astrophysical observation of a variation of α implies a time variation of Λ_c of the order of at least 10^{-15} / year. Several experiments in Quantum Optics, which were designed to look for a time variation of Λ_c , are discussed.

ON FORESTER'S CONJECTURE AND RELATED RESULTS

Rabeya Basu and Raja Sridharan

Tata Institute of Fundamental Research, Homi Bhabha Road, Mumbai -400 005

Abstract

In this paper we give a self contained exposition of proofs of the Quillen-Suslin Theorem, a conjecture of Forster and some related work done by Indian Mathematicians in the field of Projective Modules and Complete Intersections.

Key words: Dimension, number of generators of ideals, prime ideals, unimodular Rows.

INTERRELATIONSHIP BETWEEN GROWTH AND SEXUAL MATURITY OF WELL- OFF CHANDIGARH CHILDREN

A.K. Bhalla

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Abstract

Body weight, height and sexual maturation of 134 well-off Chandigarh adolescent boys and 109 girls were assessed to study interrelationship between physical growth and sexual maturity, using mixed longitudinal research design. In boys, initiation of puberty was marked by attainment of genitalia stage G-II at 11.5 years when they weighed 43.8 ± 1.1 kg and measured 146.2 ± 2.0 cm in height. In girls, onset of puberty occurred at 10.3 years with attainment of breast development stage B-II, when these girls weighed 29.4 ± 2.0 kg and possessed height of 132.9 ± 1.2 cm. Menarche in study girls occurred at mean age of 12.4 years, when they weighed 36.5 ± 1.1 kg and possessed height of 143.1 ± 2.0 cm. The findings of study reveal that onset of sexual maturity in well-off Chandigarh boys & girls appear to be a body size related phenomenon that occurred after attaining specific weight and height growth values the magnitude of which however, varied for each component of sexual maturation.

Key words: Body growth, breast development, genitalia, menarche, sexual maturity.

ULTRASTRUCTURE OF FISH SCALES AS A TOOL IN FISH IDENTIFICATION UP TO SPECIES LEVEL OF GENUS *PUNTIUS* HAMILTON

M.S. Johal* and Monita Dhiman

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Abstract

Some freshwater fish genera especially from Asian region having large number of fish species having taxonomic ambiguity pose problems for their identification considering morphological and meristic characters. Most of the advance molecular identification techniques can not be applied due to certain limitations such as high cost, non-availability of equipments at the disposal of the taxonomists and lack of expertise. Keeping these limitations in mind, an alternate taxonomic tool *i.e.*, scale morphometry and ultrastructure of the fish scale as revealed by SEM has been suggested for those fish species having overlapping or confusing morphological and meristic characters. In the present studies, dichotomous key of the four species of the genus *Puntius* Hamilton from Western Ghats namely *Puntius arulius arulius* (Jerdon), *P. carnaticus* (Jerdon), *P. fasciatus* (Jerdon) and *P. melanostigma* (Day) using scale morphometry and ultrastructural characters viz., the focus structure, origin of radii and details of lepidonts has been given. It has been opined that the shape, size and distributional pattern of chromatophores present on the dorsal surface posterior region of the scale can not be employed for taxonomic purpose in the species under report. This type of key has been proposed for the first time.

Key words: Cycloid scale, *Puntius* spp., SEM, Ultrastructure.

STUDIES ON INTERNAL MALE REPRODUCTIVE ORGANS OF TEN INDIAN SPECIES OF GENUS *SPILARCTIA* BUTLER (ARCTIIDAE : LEPIDOPTERA)

Jagbir Singh Kirti* and Jagpreet Singh Sodhi

Department of Zoology, Punjabi University, Patiala – 147 002

Abstract

Ten species viz. *leopardina* (Kollar), *casignata* (Kollar), *comma* Kollar, *niceata* (Stoll), *erythrozona* (Kollar), *multiguttata* (Walker), *obliqua* (Walker), *rubilinea* (Moore), *multivittata* Moore and *subfascia* Walker, belonging to genus *Spilarctia* Butler have been dissected out to study the morphology of male internal reproductive organs. Key to the species on the basis of male internal genitalic attributes has been formulated.

Key words: Arctiidae, Male reproductive organs, Species, *Spilarctia*.

CONTRIBUTION TO THE KNOWLEDGE OF *HYPNUM CUPRESSIFORME* HEDW. SP. MUSC. FROM THE KUMAON HILLS (WESTERN HIMALAYAS)

Dinesh. K. Saxena*, Kajal Srivastava, and Shivom Singh

Department of Botany, Bareilly College, Bareilly

Abstract

Paper provides an illustrated account of moss *Hypnum cupressiforme* Hedw. Sp. Musc. based on an extensive collections made during 2004-2005 from various sites of the Kumaon hills. Observations on taxonomic characteristics from populations of *H. cupressiforme* have been described. Dioecious, medium-sized plants with very short nerves characterize the species. The taxonomic description and discussion relating to the authenticity and extent of variability in the populations of *H. cupressiforme* has been provided.

Key words: *Hypnum cupressiforme*, Kumaon hills, taxonomy.

STUDIES ON DIVERSITY OF BRYOPHYTE AND PTERIDOPHYTE FLORA OF SITAMATA WILD LIFE SANCTUARY (RAJASTHAN)

B.L. Chaudhary and C. S. Dulawat*

Department of Botany, College of Science, Mohanlal Sukhadia University, Udaipur -313 001

Abstract

The present study has been carried out in Sitamata Wild life Sanctuary of Chittorgarh and Udaipur district located in southwest region of Rajasthan. A field survey of the study area was carried out in the year 2004-2005 to document the Bryophytes and Pteridophytes. In total, sixteen species of bryophytes and pteridophytes have been reported from this area. Eight species of bryophytes *Anthoceros subtilis* St., *Asterella blumeana* (Nees) Kachroo., *Bryum argenteum* Hedw, *Cyathodium barodae* Chavan., *Fissidens diversifolius* Mitt., *F. geminiflorus* var. *nagasakinus* (Besh.) Dox., *Hyophila involuta* (Hook.) Jaeg., *Riccia gangetica* Ahmad., and eight species of pteridophytes *Actiniopteris radiata* (Swartz.) Link., *Adiantum capillus-veneris* Linn., *Adiantum incisum* Forsk., *Adiantum lunulatum* Brum., *Azolla pinnata* R.Br., *Cheilanthes albomarginata* Clarke., *Marsilea minuta* L. and *Pteris vittata* L.. have been recorded.

Key words: Bryophyte, Diversity, Flora, Pteridophyte, Sitamata Wild Life Sanctuary Rajasthan.

A REPORT ON RATE OF GLUCOSE UPTAKE AND LEAKAGE IN ADULT *ISOPARORCHIS HYPSELOBAGRI* (DIGENEA:TREMATODA)

Bireshwar Bera and Buddhadeb Manna*

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Abstract

Glucose uptake and glucose leakage by adult *Isoparorchis hypselobagri* (Trematoda:Digenea) recovered from the swim-bladder of *Wallago attu* were studied in *in vitro* starvation condition in the culture medium. The glucose uptake rates of *Isoparorchis hypselobagri* were much lower in phosphate buffer saline (PBS) solution than in the same media supplemented with 10% bovine serum albumen (BSA). The leakage of glucose from the fluke body to the incubating medium during *in vitro* starvation is more or less a factor of incubation time and quality of the medium.

Key Words: Glucose leakage, glucose uptake, *Isoparorchis hypselobagri*, starvation.

AN ENUMERATION OF LICHEN GENUS *HETERODERMIA* TREVIS. FROM NANDA DEVI BIOSPHERE RESERVE

I. B. Prasher* and Amit Jakkhal

Department of Botany, Panjab University, Chandigarh – 160 014

Abstract

Five species of genus *Heterodermia* Trevis. (Family Physciaceae) are being described from Nanda Devi Biosphere Reserve (Uttaranchal). The species are: *Heterodermia angustiloba* (Mull. Arg.) Awas., *H. microphylla* (Kurok.) Skorepa, *H. pseudospeciosa* (Kurok.) Awas., *H. rubescens* (Ras.) Awas. and *H. speciosa* (Wulfen) Trevis. Detailed taxonomic account of each species including morphological and anatomical descriptions, chemistry (chemical tests & TLC), distribution and ecological data concerning the altitudes of occurrence, type of rock and other data regarding host-range is given.

Key Words: Chemotaxonomy, *Heterodermia*, Lichen, Nanda Devi Biosphere Reserve, taxonomy.

EFFECT OF REPLACEMENT OF FISHMEAL WITH DIETARY PROTEIN SOURCES OF PLANT ORIGIN ON THE GROWTH PERFORMANCE AND NUTRIENT RETENTION IN THE FINGERLINGS OF *CHANNA PUNCTATUS* (BLOCH.) FOR SUSTAINABLE AQUACULTURE

Meenakshi Jindal, S.K. Garg, and N.K. Yadava

Dept. of Zoology & Aquaculture, CCS Haryana Agricultural University, Hisar - 125 004

Abstract

To study the growth performance of fish *Channa punctatus*, ten iso-caloric and iso-nitrogenous experimental diets (1 - 10) were formulated by replacing fishmeal (FM) with hydrothermally processed soybean (HPS) and defatted canola (DFC) from the reference diet with and without supplementing the diets with mineral premix and amino-acids (MPA). Studies have revealed that when the diets were supplemented with MPA, a significantly ($p < 0.05$) high live weight gain, low feed conversion ratio (FCR) and high protein efficiency ratio (PER) and apparent protein digestibility (APD) values were observed in fishes fed on HPS as compared to the fish fed on DFC based diets. A reduction in excretory levels of total ammonia ($\text{NH}_3\text{-N}$) and reactive phosphate (P) production was observed with increase in the inclusion levels of HPS and DFC in the diets supplemented with MPA. Such a replacement could save total feed costs and alleviate pollution problems in intensive aqua-cultural systems.

Key words: Carcass, *Channa punctatus*, defatted canola, digestibility, excretion, growth, processed soybean, protein.

CADMIUM TOXICITY IN PLANTS AND BIOREMEDIATION

Shilpa Goel, Jahid Ali Malik, Harsh Nayyar*, and I.S.Dua

Department of Botany, Panjab University, Chandigarh - 160 014

Abstract

Heavy metals pose a serious threat to the environment and living organisms since these tend to bioaccumulate. Cadmium (Cd) is one of the most toxic heavy metals, which is elevating dangerously in the soil and water. Its damaging effects appear even at very low concentrations due to its high mobility.

This paper presents concise recent information about toxic effects of Cd on plants and the adaptive mechanisms employed for survival. Suitable bioremediation approaches to overcome Cd effects are also discussed.

Key words: Bioremediation, biochemical changes, cadmium, physiological changes.

EFFECT OF SALT STRESS ON *RHIZOBIUM*-LEGUME SYMBIOSIS IN PEA, LENTIL AND CHICKPEA

Neera Garg , Geetanjali, Zahid Noor, and Anu

Department of Botany, Panjab University, Chandigarh – 160 014

Abstract

The experiments were conducted on three legume species namely pea (*Pisum sativum* L.), lentil (*Lens esculenta* L.) and chickpea (*Cicer arietinum* L.) in order to study their relative tolerance towards salinity in terms of germination, biomass and nodule function. *Pisum sativum* (field pea) showed relatively higher tolerance towards the saline environment and reflected least negative effects, *Lens esculenta* (lentil) was moderately tolerant and *Cicer arietinum* (chickpea) was highly sensitive to the presence of salts. Salt stress depressed the growth and symbiotic association of all the nodulated legume species. However, the tolerance to salinity in the tolerant species could be attributed to higher root/shoot biomass, increased nodule number as well as dry mass, least degeneration of leghemoglobin pigment, higher ammonia assimilating enzymes activity, and the resultant seed yield.

Key words: *Cicer arietinum*, *Lens esculenta*, N-assimilation, *Pisum sativum*, *Rhizobium*, salt stress.

SOME CHAETOPHORALEAN TAXA (CHLOROPHYTA) FROM PUNJAB, INDIA

Rimpy Dhingra and A.S. Ahluwalia*

Department of Botany, Panjab University, Chandigarh – 160 014

Abstract

The present communication takes into account only five chlorophycean taxa belonging to order Chaetophorales. These comprise 1 species of *Microthamnion* Naegeli ex Kuetzing and 4 species of *Stigeoclonium* Kuetzing. Among these 5 taxa, 4 are new records for Punjab State as based on the report of Punjab State Council of Science and Technology, Chandigarh in 1995.

Key words: Chaetophorales, Chlorophyta, India, Punjab.

SEXUAL SELECTION FOR OFF-SPRINGS IN THREE CASTE GROUPS OF BHIMTAL (District, Nainital) UTTRAKHAND

Purnima Parashar*, Himani Mankotia, and C.J. Edwin

Department of Anthropology, Panjab University, Chandigarh – 160 014

Abstract

The present study highlights the varying sex ratio, brood size, and birth interval between the offsprings of the three caste groups i.e., Aryas (Scheduled Caste), Brahmins, and Thakurs of Bhimtal (District Nainital), Uttarakhand. The three communities are largely agricultural in

occupation. The total number of subjects were 357 and *random* sampling method was used. The family size is large with brood size having 3 to 4 children per woman. While the sex ratio of the children show no evidences of sexual selection, the figures for the last birth indicate male preferences. The three communities behave similarly and do not seem to manipulate sex ratios by foeticide or infanticide. Although there is a desire for male child as is evident in sex ratio of the last birth. This results in larger brood sizes and shorter birth intervals (between 2 to 3 years). The absence of inter community variation is indicative of a common socio-culturally determined social selection for brood size and desired sex of offspring among the three communities of Bhimtal.

Key words: Bhimtal, Brood size, Sexual selection, Sex-ratio

BODY SIZE AND MENARCHEAL STATUS OF ADOLESCENT GIRLS OF NAHAN, HIMACHAL PRADESH

Taranpreet Kaur* and R.K. Pathak

Department of Anthropology, Panjab University, Chandigarh – 160 014

Abstract

The adolescent growth spurt is a constant phenomena in all children, and the knowledge of how far a child has progressed through adolescence is often required in anthropological, clinical and educational work. Menarche occurs almost invariably at the time of maximum deceleration of height velocity (Harrison *et al.*, 1977). With this background the present study is conducted on a cross-sectional sample of 286 school going girls aged 11-16 years of Nahan area in Sirmaur district of Himachal Pradesh. The averages for Height, Weight and Menarcheal age are presented. The results reveal that the girls, in whom menarche had occurred, were heavier and taller than the girls in whom menarche had not occurred.

Key words: Height, Menarche, Nahan, Weight.

SENSITIVITY OF MICROSOMAL GLUCOSE-6-PHOSPHATASE TO THE NON-IONIC DETERGENT NONIDET-P40 IN RAT LIVER AND HUMAN TERM PLACENTA

Rajesh Sehgal, Shailender S. Kanwar, and Sankar N. Sanyal*

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Abstract

Sensitivity of the microsomal glucose-6-phosphatase (G-6-Pase) to a non-ionic detergent, nonidet P-40 which is an octyl phenol ethylene oxide was studied by the substrate kinetic characterization, thermal stability and the latent behavior of the enzyme in rat liver and human term placental microsomal membranes. Nonidet P-40 stimulated the activity about 2-fold at a 0.085% detergent concentration when incubated the membrane for 30 min at 37°C. The kinetics was studied using two substrates, G-6-P and NaPP_i at a concentration of 3-30mM. The detergent treatment caused an elevation in the V_{max} and a decrease in K_m with both G-6-P and NaPP_i. Also, in the detergent disrupted microsomes, two apparent K_m are visible, K_m(max) and K_m(min) indicating the presence of a multicomponent system. The enzyme also showed an extreme latency, 78% and 66% of G-6-Pase and NaPP_iase activity, in the intact membrane. It showed very little non-specific phosphohydrolase activity as revealed by using β-glycerophosphate which amounted upto 2-5% of the G-6-Pase activity in both the intact and detergent disrupted microsomes. The results of the present study suggest that the detergent induced changes in the kinetic properties of G-6-Pase represents the removal of the constraints imposed by the membrane environment on the catalytic subunit and the putative transport proteins of the enzyme.

Keywords: Glucose-6-phosphatase, human term placenta, kinetics, microsomes, nonidet P-40, rat liver.

STUDY ON THE THERMAL STABILITY OF MICROSOMAL GLUCOSE-6-PHOSPHATASE IN RAT LIVER AND HUMAN TERM PLACENTA IN NONIDET-P40 TREATMENT

Rajesh Sehgal, Shailender S. Kanwar, and Sankar N. Sanyal*

Department of Biophysics, Panjab University, Chandigarh - 160 014

Abstract

Effects of temperature on G-6-Pase in rat liver and human term placenta have revealed that only the enzyme activity of intact microsomes exhibited non-linear Arrhenius relationships, whereas the detergent modified microsomes showed a linear temperature response. A transition temperature of 25°C was calculated while the energy of activation from the slope of the line relating to $1/T$ versus $\log V_{\max}$ from the continuous line in the detergent treated microsomes and in case of the intact microsomes from the line below the transition temperature, do correspond reasonably well. The absence of discontinuity in the Arrhenius line in the detergent treated microsomes may relate to the phospholipid effect on the enzyme in the membrane environment. The thermal stability of G-6-Pase in rat liver and human term placenta microsomes was examined in untreated and NP-40 treated microsomes. Heat treatment upto a temperature of 44°C did not cause the enzymatic activity to decline to zero but resulted in a small residual activity that was relatively stable, which was further stimulated by the addition of detergent. The decline in enzyme activity followed a first order kinetics with a single rate constant (K_{inact}). The Arrhenius plot of $\log K_{\text{inact}}$ versus the reciprocal of temperature showed proximity and parallelism with intact and detergent treated microsomes. Also, it showed typically large inactivation enthalpies (ΔH) with relatively small value for entropy change (ΔS). Detergent treatment led to a large decrease in ΔH in placenta, while ΔS revealed a large increment but no significant difference in ΔG . The data may suggest different pathways of G-6-Pase inactivation to thermal treatment in the intact and detergent treated microsomes.

Keywords: Glucose-6-phosphatase, human term placenta, microsomes, nonidet P-40, rat liver, thermal stability.

INHIBITION KINETICS OF G-6-PHOSPHATASE SYSTEM WITH NAF IN THE NONIDET-P40 TREATED MICROSOMES IN RAT LIVER AND HUMAN TERM PLACENTA

Rajesh Sehgal, Shailender S. Kanwar, and Sankar N. Sanyal*

Department of Biophysics, Panjab University, Chandigarh, 160 014

Abstract

At millimolar concentration, NaF was found to inhibit the Glucose-6-phosphatase (G-6-Pase) enzyme system using Glucose-6-Phosphate as the substrate. The kinetics revealed sigmoidal pattern indicating allosteric behavior of the enzyme. Addition of NaF produced a linear non-competitive inhibition in the intact microsomes in both liver and human term placenta, while in the detergent treated microsomes, the inhibition changed to the uncompetitive type. Also, NaF allosterically inhibited the G-6-Pase activity at a low substrate concentration. It was biphasic in the initial rate velocity versus the substrate in a Hanes-Woolf plot and a Hill coefficient of more than 1 obtained from the Hill plot.

Keywords: Glucose-6-phosphatase, human term placenta, microsomes, NaF inhibition kinetics, nonidet P-40, rat liver.

TAXONOMY OF MOSS *ISOPTERYGIUM ELEGANS* (BRID.) LINDB., FROM KUMAON HILLS

Dinesh K. Saxena*, Shivom Singh, and Kajal Srivastava

Bryology Science Division, Department of Botany, Bareilly College, Bareilly

Abstract

Taxonomic description of the moss *Isopterygium elegans* along with ecological observations is presented in this paper. For present study seasonal surveys of Kumaon hills for bryophytes (mosses) were carried out during 2004-2005 till date to enumerate detail characteristics of this epiphytic moss.

Key words: Ecology, *I. elegans*, Kumaon hills, taxonomy.

PARALLELISM IN RELATIONAL DATABASE MANAGEMENT SYSTEMS

Pushpa Suri and Sudesh Rani*

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Abstract

Parallelism is the key to realizing high performance, scalable, fault tolerant database management systems. With the predicted future database sizes and complexity of queries, it has become necessary to exploit parallelism in query processing. In this paper we discuss the intraquery parallelism in a relational database management system (DBMS). We provide a broad framework for the study of the numerous issues that need to be addressed in supporting parallelism efficiently and flexibly. Classification analysis of architectures of parallel database systems is also discussed. In the final part we discuss the major issues in DB2 intraquery parallelism.

Keywords: Parallel Database Systems, partitioned parallelism, pipelined parallelism, Query, Relational Database, , Relational Algebra Operators.

A SURVEY OF WEB SERVERS IN EDUCATIONAL DOMAINS

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Abstract

This paper presents an investigation of the trend occurring between the type of organization whom the website belongs to and the operating system platform along with the web server for hosting website in the given Indian domains. The study employed recent configuration of websites. The trends reflect the preference to proprietary software's in government and commercial websites. Educational sites use open source software. The incremental change in operating system and web server platform is also higher among educational sites, which reflects better level of commitment and awareness about the current resources among the staff responsible for maintaining the availability of websites in the educational Institutions. The paper concludes that educational Institutions in India are already making effective use of the resources by deploying open source software. Government of India also need to reorient its approach toward open source software deployment in government related services and thereby save money allocated for Information Technology to be spent on better activities.

Key Words: Open source, proprietary, Web servers.

USING DEFECT REPOSITORY TO DETERMINE FREE/OPEN SOURCE SOFTWARE QUALITY

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Abstract

The invention of Internet can be termed as a major breakthrough in the field of Information and Communication Technology (ICT). The expansion of Internet in the 90's inspired a novel model of software development in form of Free/ Open Source Software (F/OSS). The F/OSS development practices are giving rise to a new view of how complex software systems can be constructed, deployed and evolved. The reason for the increasing proliferation of F/OSS is not only the low cost and easy access to the code, but also consistently high quality of software products. The quality and suitability is achieved through an elaborate peer-review process performed by a large community of users, who act as co-developers to identify and correct software defects and request or add features. These characteristics give a large boost to software development resulting in a more effective software production, with true field testing and fast defect fixing. In this paper, publicly accessible defect data of five F/OSS hosted on a collaborative development site is used to determine the impact of defect handling in F/OSS maintenance quality. The results indicate that the defect locating effectiveness and the defect resolution efficiency is gradually strengthening which is resulting in gradual improvement in F/OSS quality. The insights gained from the current study can be supplemented with additional data about the projects and their defects to build models, perform analyses and provide valuable feedback to further improve F/OSS quality.

Keywords: Backlog management index, defect handling, free software, Open source, software quality.

METRICS FRAMEWORK FOR REENGINEERING PROCESS

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Abstract

Reengineering is the examination and alteration of an existing system to reconstitute it into a new form and the subsequent implementation of the new form. The objective is to maintain the existing functionality and prepare for functionality to be added later. Software Metrics measure certain properties of a software project by mapping them to numbers (or other symbols) according to well defined, objective measurement rules. Usually, measurements are made to provide a foundation of information upon which decisions about software engineering tasks can be both planned and performed better. In this paper, a metrics framework has been proposed, that can be used to calculate reengineering requirement cost (RRC) & reengineering requirement cost of module (RRCM). On the basis of the results obtained by this metric, a decision can be made regarding maintenance / reengineering / retirement need of the software / part of software.

Keywords: Defect Cost, Fault Cost, PRCM, Reengineering, Reengineering Requirement Cost, Software Maintenance, Software Metrics.

CONSTRUCTING THE CKM AND PMNS MATRICES

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Abstract

The CKM and PMNS matrices have been constructed based on the latest measurements, largely free from theoretical inputs as well as likely New Physics effects in the case of the former. To facilitate the construction of the CKM matrix in the PDG representation as well as in view of the comparatively large error in the measured value of the CP violating phase δ , the possibility of its construction from the tree level measured CKM elements has also been explored using the unitarity triangle. In view of the persistent difference between the $|V_{ub}|$ exclusive and inclusive values, we have carried out separate analyses corresponding to these. The PMNS matrix has been constructed by incorporating the constraints due to solar and atmospheric neutrinos as well as by giving full variation to the Dirac-like CP violating phase δ and considering different values of s_{13} having implications for different models of lepton mass matrices. Taking clue from quark mixing phenomenology, an analogous analysis of the leptonic unitarity triangle allows an estimate of the likely presence of CP violation in the leptonic sector.

Key words: CKM and PMNS matrices, Neutrino mixing, quark mixing.