KAMALUDDIN ET AL (2017), *FUUAST J. BIOL.*, 7(1): 61-73

A CLADISTIC ANALYSIS OF PYRALID SPECIES (LEPIDOPTERA: PYRALIDAE) FROM PAKISTAN.

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Abstract

A cladistic analysis of thirty species of twenty five genera of the family Pyralidae is carried out from Pakistan using their apomorphic characters and discuss their relationships to each other.

Introduction

The cladistic analysis is a task which gives the results of evolutionary relationship of the studied taxa. Most of the authors attempted this task using the apamorphic similarities . Among the different families of the Lepidoptera Peigler (1993) , Kamaluddin *et al.,* (1997 , 1999 , 2000 , 2013 a and b and recently 2015) , Emerson *et al*., (1997), Brower (2000) and Decamargo *et al*., (2009) were attempted.

In Pakistan the cladistic analysis of the representatives of different families attempted and revived by Kamaluddin *et al.,* (1997) with reference to Lymartrid genera , Kamaluddin *et al*., (1999) attempted key to the genera , distributional ranges and cladistic analysis of sphingid genera, Kamaluddin *et al.,* (2000 , 2013a and 2013b) attempted cladistic analysis of the subfamily Trifinae , Plucinae and Noctuinae respectively of the family Noctuidae using apomorphies of the included taxa, and recently in 2015 attempted cladistic analysis of the family Geomatridae.

Materials and Methods

For the study of cladistic analysis of thirty pyralid species of the family Pyralidae a cladogram has been constructed using their apomorphic characters which were scanned from external morphological characters including colour patterns of entire body , characters of head components including proboscis , segments of maxillary palpi , wings and their venations and their males and females genital components. All these characters were coded as a_0 ,b_0 ,$c_{0\ etc}$ indicated as pleisiomorphy which are not discussed in text where as the states a_1 ,a_2 ,b_1 ,b_2 ,b_3 and so on in ascending order explain , derived , more derived and specially derived states.

Result

A. Characters:

a 0 General body features not resemble.
a 1 General body features resemble. (Thyradidae and Pyralidae)

b 0 Body brilliantly pattern.
b 1 Body light and dull coloured. (Thyradidae and Pyralidae)

c 0 Frons flat.
c 1 Frons rounded not produced. (*Microstega* to *Paracorsia*)
c 2 Frons broad rounded. (*Paralipsa* to *Chrysoteuchia*)
c 3 Frons usually conically produced anteriad. (*Cnaphalocrocis* to C*hilo*)
c 4 Frons produced. (*Cnaphalocrocis* to *Ancylolomia*)
c 5 Frons anteriorly conically produced. (*Patissa* and *Schoenobius*)
c 6 Frons remarkably conical. (*Chilotrea* and *Chilo*).
c 7 Frons convex. (*Elophila diffualis*)
c 8 Frons sub-rounded produced anteriad. (*Hymenia*)

d 0 Proboscis well developed.
d 1 Proboscis smooth at base. (Thyradidae)
d 2 Proboscis with scales at base. (All pyralids)
d 3 Proboscis usually developed. (*Cnaphalocrocis* to *Nymphula*)
d 4 Proboscis absent or minute. (*Niphadoses* to *Eurhodope*)

d 5 Proboscis minute. (*Cnaphalocrocis* and *Pseudoancylolomia*)
d 6 Proboscis wanting. (*Ancylolomia chrysographella* & *A. uniformella*)

e 0 Maxillary palpi very small.
e 1 Maxillary palpi small. (Thyradidae)
e 2 Maxillary palpi well developed. (All pyralids)
e 3 Maxillary palpi developed with scattered scales (*Microstega* to *Hymenia*)
e 4 Maxillary palpi well developed and dilated with scales. (*Cnaphalocrocis* to *Crambus*)

f 0 Palpi short not porect.
f 1 Palpi usually porect. (*Cnaphalocrocis* to *Crambus*)
f 2 Palpi usually upturned. (*Microstega* to *Hymenia*)
f 3 Palpi anterorly directed or slightly oblique. (*Elophila* Spp.*)*
f 4 Palpi porect , anterorly directed. (*Cnaphalocrocis* to *Pediasia)*
f 5 Palpi obliquely turned. (*Crambus*)
f 6 Palpi anterorly directed. (*Elophila diffualis*)
f 7 Palpi slightly obliquely produced. (*Elophila nymphaeata)*
f 8 Palpi upturned. (*Scriophaga*)
f 9 Palpi slightly upturned. (*Nymphula*)

g 0 Maxillary palpi short.
g 1 Maxillary palpi moderate not more than 2X the eyes. (*Niphadoses* to *Scirpophaga*)
g 2 Maxillary palpi very large more than 3X the eyes. (*Patissa* to *Schoenobius*)

h 0 Maxillary palpi less than head length.
h 1 Maxillary palpi about 1.5X the head length. (*Cnaphalocrocis*)
h2 Maxillary palpi more than 2X the head length. (*Pseudoancylolomia*)

i 0 Maxillary palpi with second segment much longer than basal segment.
i 1 Maxillary palpi with second segment about equal to basal segment. (*Pempelia* and *Eurhodope*)

i 2 Maxillary palpi with second segment longer than basal segment. (*Niphadoses* to *Schoenobius*)
j 0 Apex of third maxillary segment broadly rounded.
j 1 Apex of third maxillary palpi rounded. (*Microstega* and *Nomophila*)
j 2 Apex of third maxillary palpi truncated. (*Pleuroptya*)
j 3 Apex of third maxillary palpi narrowed. (*Ancylolomia uniformella)*
j 4 Apex of third maxillary palpi blunt and truncated. (*Ancylolomia chrysographellus*)

k 0 Third segment of maxillary palpi much shorter than second segment.
k 1 Third segment of maxillary palpi always shorter than second segment. (*Microstega* to *Paracorsia*)
k 2 Third segment of maxillary palpi slightly longer than second segment (*Hymenia*)

l 0 Second segment of maxillary palpi more than 4X the third segment.
l 1 Second segment of maxillary palpi less than 4X the third segment. (*Cnaphalocrocis* to *Eurhodope*)
l 2 Second segment of maxillary palpi more than 4X the third segment. (*Aglossa*)
l 3 Second segment of maxillary palpi less than 3X the third segment. (*Cnaphalocrocis* to *Pediasia*)
l 4 Second segment of maxillary palpi much longer than third segment. (*Elophila* Spp.)
l 5 Second segment of maxillary palpi more than3X the third segment. (*Crambus*)
l 6 Second segment of maxillary palpi only slightly longer than third segment. (*Nymphula*)
l 7 Second segment of maxillary palpi about 1.75 X the third segment. (*Nomophila*)
l 8 Second segment of maxillary palpi 2X the third segment. (*Schoenobius*)
l 9 Second segment of maxillary palpi about 2.5X the third segment. (*Microstega*)
I 10 Second segment of maxillary palpi 3X the third segment. (*Pseudoancylolomia*)
l 11 Second segment of maxillary palpi dilated about 3X the length of third segment. (*Chilotreae*)
l 12 Second segment of maxillary palpi about 4X the third segment. (*Cnaphalocrocis*)

m 0 Wings much broad.
m 1 Wings usually broad. (*Microstega* to *Hymenia*)
m 2 Wings usually narrowed. (*Cnaphalocrocis* to *Crambus*)

n 0 Both wings remarkably brilliant.
n 1 Mesonotal wings with less than five horizontal striations or wings with not so brilliently coloured. (*Cnaphalocrocis* to *Eurhodope)*
n 2 Both wings not brilliently pattern, usually mesonotal wings with less number of patches. (*Cnaphalocrocis* to *Hymenia*)
n 3 Both wings brilliently patterned with large number of dark patches. (*Elophila* and *Nymphula*)
n 4 Mesonotal wings with five horizontal black striation. (*Aglossa*)

o 0 Anterior margin of mesonotal wings straight.
o 1 Anterior margin of mesonotal wings convex. (*Chilotreae* and *Chilo*)
o 2 Anterior margin of mesonotal wings sinuated. (*Cnaphalocrocis* to *Ancylolomia*)

p 0 Mesonotal wings with more than one vein unite or stalked.
p 1 Mesonotal wings with 1-3 veins unite or stalked. (*Cnaphalocrocis* to *Chrysoteuchia*)
p 2 Mesonotal wings with all veins isolated. (*Pediasia*)

q 0 Mesonotal wings with veins Sc and R1 unite at base.
q 1 Mesonotal wings with veins Sc and R1 parallel to each other. (*Cnaphalocrocis* and *Pseudoanyclolomia*)
q 2 Mesonotal wings with veins Sc and R1 either close or unite with cross vein at middle. (*Ancylolomia* Spp.)
q 3 Mesonotal wings with veins Sc and R1 isolated or medially touching then isolated. (*Niphadoses* to *Scripophaga*)
q 4 Mesonotal wings with veins Sc and R1 medially touches but not fused. (*Niphadoses*)
q 5 Mesonotal wings with veins Sc and R1 unite by a cross vein. (*Patissa* and *Schoenobius*)

r 0 Mesonotal wings with veins R2 and R3 isolated.
r 1 Mesonotal wings with veins R2 and R3 unite and arise from below upper angle of cell. (*Microstega*)
r 2 Mesonotal wings with veins R2 and R3 largely stalked and arise from below upper angle of cell. (*Pempelia*)
r 3 Mesonotal wings with veins R2 and R3 largely stalked unite with R4 and arised from upper angle of cell. (*Nomophila*)
r 4 Mesonotal wings with veins R2 and R3 stalked, further stalked with R4 and unite with R5 arising from upper angle of cell. (*E. kamali*)
r 5 Mesonotal wings with veins R2 and R3 shortly stalked further stalked with R1 and arise far beyond upper angle of cell. (*Patissa)*
r 6 Mesonotal wings with veins R2 and R3 largely stalked and arise just below upper angle of cell. (*Schoenobius*)

s 0 Mesonotal wings with veins R3 and R4 isolated.
s 1 Mesonotal wings with veins R3 and R4 unite or only R4 arising from upper angle of cell. (*E. nymphaeta* and *E. diffualis*)
s 2 Mesonotal wings with veins R3 and R4 isolated R3 arise from upper angle of cell. (*Paralipsa*)
s 3 Mesonotal wings with veins R3 and R4 unite and arise from upper angle of cell. (*Calamotropha*)
s 4 Mesonotal wings with veins R3 and R4 unite and arise from just below upper angle of cell. (*Crambus perlella*)
s 5 Mesonotal wings with veins R3 and R4 shortly stalked and arise from upper angle of cell. (*Cnaphalocrocis*)
s 6 Mesonotal wings with veins R3 and R4 largely stalked unite with R5 and arise from upper angle of cell. (*Pseudoancylolomia*)

t 0 Mesonotal wings with veins R4 or R5 not arise from upper angle of cell.
t 1 Mesonotal wings with vein R4 arise from upper angle of cell. (*Microstega* to *Pleuroptya*)
t 2 Mesonotal wings with vein R5 arise from upper angle of cell. (*Diaphania*)

u 0 Mesonotal wings with three anal veins.
u 1 Mesonotal wings with one anal vein. (*Cnaphalocrocis* to *Chilo*)
u 2 Mesonotal wings with two anal veins. (*Paralipsa* to *Chrysoteuchia*)

v 0 Metanotal wings much broad.

v 1 Metanotal wings broad. (*Pempelia and Eurodope*)
v 2 Metanotal wings narrowed. (*Niphadoses to Schoenobius*)

w 0 anterior margin of metanotal wings straight.
w 1 anterior margin of metanotal wings convex. (*Ancylolomia uniformella*)
w 2 anterior margin of metanotal wings sinuated. (*Ancylolomia chrysographella)*

x 0 Metanotal wings with veins Sc + R1 fused with Rs.
x 1 Metanotal wings with veins Sc + R1 isolated from Rs. *(Microstega* to *Diaphania*)
x 2 Metanotal wings with veins Sc + R1 parallel to Rs. (*Pempelia*)
x 3 Metanotal wings with veins Sc + R1 stalked with Rs. (*Eurodope*)
x 4 Metanotal wings with veins Sc + R1 largely stalked with Rs. (*Chilotreae*)
x 5 Metanotal wings with veins Sc + R1 unite with Rs by cross vein. (*Chilo)*
x 6 Metanotal wings with veins Sc + R1 stalked with Rs and arise just below upper angle of cell. (*Calamotropha*)
x 7 Metanotal wings with veins Sc + R1 largely stalked and arise far beyond upper angle of cell. (*Paralipsa*)
x 8 Metanotal wings with veins Sc + R1 stalked with Rs and arise far beyond upper angle of cell. (*Paracorsia*)
x 9 Metanotal wings with veins Sc + R1 stalked with Rs unite with M1 and arised from upper angle of cell. (*Crambus pakistanica*)

y 0 Metanotal wings with veins Rs and M1 not stalked or unite.
y 1 Metanotal wings with veins Rs and M1 unite and arise from upper angle of cell. (*Microstega* to *Pleuroptya*)
y 2 Metanotal wings with veins Rs and M1 arise from upper angle of cell. (*E. nymphaeta* and *E. diffualis*)
y 3 Metanotal wings with veins Rs and M1 stalked and unite with M2 and arise from upper angle of cell. (*E. kamali*)
y 4 Metanotal wings with veins Rs and M1 stalked and arise from upper angle of cell. (*Crambus perlella*)
y 5 Metanotal wings with veins Rs and M1 largely stalked. (*Diaphania*)

z 0 Metanotal wings with veins M2 and M3 largely stalked.
z 1 Metanotal wings with veins M2 and M3 isolated and arised from lower angle of cell. (*Microstega* and *Nomopila*)
z 2 Metanotal wings with veins M2 and M3 isolated. (*Cnaphalocrocis* and *Pseudoancylolomia*)
z 3 Metanotal wings with veins M2 and M3 unite. (*Ancylolomia Spp.*)
z 4 Metanotal wings with veins M1 arise from upper angle of cell. (*Paralipsa* and *Calamotropha*)
z 5 Metanotal wings with vein M3 arises from upper angle of cell. (*Eurodhope)*
z 6 Metanotal wings with veins M1 and M2 unite and arise from upper angle of cell. (*Chrysoteuchia*)
z 7 Metanotal wings with veins M2 and M3 isolated and M3 arise from lower angle of cell. (*Calamatropha*)
z 8 Metanotal wings with veins M2 and M3 wide apart. (*Schoenobius*)
z 9 Metanotal wings with veins M2 and M3 unite and arise from lower angle of cell. (*Patissa*)
Za0 Metanotal wings with vein Cu1 arise above lower angle of cell.
Za1 Metanotal wings with vein Cu1 arise below lower angle of cell. (*Nephadoses*)
Za2 Metanotal wings with vein Cu1 arise from lower angle of cell. (*Scripophaga*)
Zb0 Metanotal wings with three anal veins.
Zb1 Metanotal wings with two or three anal veins. (*Microstega* to *Pleuroptya*)
Zb2 Metanotal wings with two anal veins. (*Microstega* and *Nomopila*)
Zb3 Metanotal wings with only one anal vein. (*E. kamali*)
Zc0 Legs short.
Zc1 Legs moderate. (*Cnaphalocrocis* to *Crambus*)
Zc2 Legs long. (*Microstega* to *Hymenia*)
Zd0 Tympanal organs well developed.
Zd1 Tympanal organs wanting. (Thyradidae)
Zd2 Tympanal organs found at base of abdomen. (All pyralids)
Ze0 Herpagon simple lobe-like.
Ze1 Herpagon of different shape. (*Cnaphalocrocis* to *Eurhodope*)
Ze2 Herpagon simple flapper-shaped. (*Microstega* to *Paracorsia*)
Ze3 Herpagon of F-shaped. (*Aglossa*)

Zf0 Apex of herpagon broadly rounded.
Zf1 Apex of herpagon lobe-like. (*Microstega* to *Pleuroptya*)
Zf2 Apex of herpagon narrowly rounded. (*Elophila nympheata)*
Zf3 Apex of herpagon sub-roundly produced. (*N. neogilveberbis*)
Zf4 Apex of herpagon truncately produced. (*N. gilveberbis*)
Zf5 Apex of herpagon broad, dagger-shaped. (*E. diffualis*)
Zf6 Apex of herpagon with hood-like shape. (*Diaphania*)
Zg0 Herpagon with inner margin rough.
Zg1 Herpagon with inner margin entire. (*Cnaphalocrocis* to *Chrysoteuchia*)
Zg2 Inner lobe of herpagon broadly blunt. (*Chilotreae)*
Zg3 Inner lobe of herpagon sharply acute. (*Chilo)*
Zh0 Herpagon simple without any process.
Zh1 Herpagon with two thorn-like processes. (*Paralipsa* and *Calamotropha*)
Zh2 Herpagon with a large spine-like process with anchor-shaped apex. (*Chrysoteuchia*)
Zh3 Herpagon narrowed, apex broad with a tubercle at inner margin. (*Crambus perlella*)
Zh4 Herpagon broad, apex narrowed with tubercle at inner margin. (*Crambus pakistanica*)
Zh5 Herpagon typical bilobed, each lobe with a thorn-like process. (*Hymenia*)
Zi0 Apex of uncus broad and entire.
Zi1 Apex of uncus either sharply pointed or blunt. (*Elophila nympheata* and *E. diffualis*)
Zi2 Apex of uncus blunt beset with hairs. (*E. diffualis*)
Zi3 Apex of uncus pointed. (*Chilo*)
Zi4 Apex of uncus sharply pointed. (*Elophila nympheata*)
Zi5 Apex of uncus truncated. (*Elophila kamali*)
Zj0 Uncus simple.
Zj1 Uncus much shorter than membranous gnathos. (*Paralipsa* to *Chrysoteuchia*)
Zj2 Uncus and gnathos sclerotized about equal in length. (*Cnaphalocrocis* to *Chilo)*
Zj3 Uncus slightly shorter than gnathos. (*Microstega* and *Nomophila*)
Zj4 Uncus and gnathos equal in length, gnathos dorsally curved. (*N. neogilviberbis*)
Zj5 Uncus much shorter than gnathos. (*Pleuroptya*)
Zj6 Uncus much longer than gnathos, gnathos ventrally curved. (*N. gilviberbis)*
Zk0 Dorso-median surface of uncus smooth. (*Ancylolomia uniformella*)
Zk1 Dorso-median surface of uncus tuberculated. (*Ancylolomia chrysographellus*)
Zk2 Dorso-median surface of uncus largely produced forming Y-shaped. (*Ancylolomia uniformella*)
Zl0 Theca simple, entire.
Zl1 Theca unilobed. (*Cnaphalocrocis* to *Ancylolomia*)
Zl2 Theca bilobed. (*Chilotreae* and *Chilo*)
Zl3 Theca with lobe-like thecal appendages. (*Elophila nympheata*)
Zl4 Theca with knob-like thecal appendages. (*Elophila diffualis*)
Zl5 Theca with pointed thorn-like thecal appendages. (*Ancylolomia chrysographellus*)
Zl6 Theca with sharply pointed beak-like thecal appendages. (*Ancylolomia uniformella*)
Zm0 Membranous conjunctiva short without any cornuti.
Zm1 Membranous conjunctiva with tubercle-like or series of small spine-like cornuti. (*Cnaphalocrocis* to *Chrysoteuchia*)
Zm2 Membranous conjunctiva with one knob-like or without cornuti. (*Microstega* to *Diaphania*)
Zm3 Membranous conjunctiva with a series of spine-like cornuti. (*Paralipsa* and *Calamotropha*)
Zm4 Membranous conjunctiva with a finger-like cornuti. (*Chrysoteuchia*)
Zm5 Membranous conjunctiva with a series of minute cornuti. (*Crambus pakistanica*)
Zm6 Membranous conjunctiva with a thorn-like blunt cornuti. (*Schoenobius*)
Zm7 Membranous conjunctiva with two thorn-like cornuti. (*Crambus perlella*)
Zm8 Membranous conjunctiva with a pair of large thorn-like cornuti. (*Paracorsia*)
Zm9 Membranous conjunctiva with lunar-shaped cornuti. (*Patissa*)
Zm10 Membranous conjunctiva with a pair of lunar-shaped cornuti beset with small spine. (*Pediasia*)
Zn0 Both apophysesses are smooth.
Zn1 Both apophysesses smooth or with short tubercles. (*Cnaphalocrocis* to *Chrysoteuchia*)
Zn2 Both apophysesses with thorn-like tubercles. (*Pediasia)*
Zo0 apophyses anterior with apex rounded.
Zo1 Apophyses anterior entire with apex blunt. (*Paralipsa*)
Zo2 Apophyses anterior with a large spine-like tubercles, apex acute. (*Calamotropha*)
Zp0 Apex of apophyses posterior sharply pointed.
Zp1 Apophyses posterior medially dialted. (*N. neogilviberbis*)

Zp2 Apophyses posterior medially gradually narrowed towards apex. (*N. gilviberbis*)
Zp3 Apex of apophyses posterior blunt. (*Scripophaga*)
Zq0 Apophyses anterior shorter than apophyses posterior.
Zq1 Both apohysesses are about equal length. (*Paralipsa* and *Calamotropha*)
Zq2 Apophyses anterior about 2X the apophses posterior. (*Chrysoteuchia*)
Zq3 Inner margin of apophyses anterior entire about 2X the apophyses posterior. (*Chilo*)
Zq4 Inner basal margin of apophyses anterior with a tubercle about 3X The apophyses posterior. (*Chilotreae*)

B. Character states

General body features (a): General body features in adults is resembles in both families Thyradidae and Pyralidae show their Synapoporphic condition (a 1).

Body colour (b): Body light or dull coloured in representative of the family Thyradidae and Pyralidae show their Synapomorphic characters (b1).

Frons (c): Frons rounded not produced in *Microstega, Nomophila, Pleuroptya, Diaphania* and *Paracorsia* show their synapomorphic condition (C1). In *Paralipsa*, and *Chrysoteuchia* frons broadly rounded show their more synapophorphic condition (C2). Frons usually conically produced in C*naphalocrocis, Pseudoancylolomia, Ancylolomia, Chilotreae* and *Chilo* show their further more synapomorphic state (C3). In *Cnaphalocrocis, Pseudoancylolomia* and *Ancylolomia* frons produced show their advance synapomorphic state (C4). Frons anteriorly conically produced in *Patissa* and *Schoenobius* show their more advance synapomorphic condition (C5). In *Chilotreae* and *Chilo* frons remarkably conical show their further more advance synapomorphic state (C6). Frons convex in *Elophila diffualis* show its autapomorphic condition (C7) in *Hymenia* frons sub-roundly prouduced anteriad show its advance autapomorphic condition (C8).

Proboscis (d): Proboscis smooth at base in all representatives of the family Thyradidae show their synapomorphic condition (d1). In all representatives of the family Pyralidae the proboscis with scales at base show their advance synapomorphic condition (d2), proboscis usually developed in *Cnephalocrocis* to *Nymphula* show their more advance synapomorphic condition (d3). In *Nephadosis* to *Eurhodope* proboscis absent or minute show their further more advance synapomorphic condition (d4). Proboscis minute in *Cnephalocrocis* and *Pseudoancylolomia* show their special synapomorphic condition (d5). In *Ancylolomia chrysographella* and *A. uniformalis* proboscis wanting show their more special synapomorphic state (d6).

Size of maxillary palpi (e): Maxillary palpi small in all the representatives of the family Thyradidae show their synapomorphic condition (e1). In all the representatives of the family Pyralidae the maxillary palpi well developed show their advanced synapomorphic condition (e2). The maxillary palpi developed with scattered scales in *Microstega* to *Hymenia* show their more advance synapomorphic condition (c3). In *Cnaphalocrocis* to *Crambus* maxillary palpi well developed and dilated with scales show their specially synapomerphic cobdition (e4).

Position of maxillary palpi (f): Palpi usually porect in *Cnaphalocrocis* to *Crambus* show their synapomorphic condition (f1). In *Microstega* to *Hymenia* palpi usually upturned show their more synapomorphic condition (f2). Maxillary palpi anteriorly directed or slightly oblique in all the species of the genus *Elophila* show their advance synapomorphic condition (f3). In *Cnaphalocrocic* to *Pediasia* the maxillary palpi porect, anteriorly directed show their more advanced synapomorphic condition (f4). The palpi obliquely turned in both species of *Crambus* show their specially more advance synapomorphic condition (f5). The maxillary palpi slightly anteriorly directed in *Elophila diffualis* show its autapomorphic condition (f6). In *Elophila nymphaeta* the maxillary palpi slightly obliquely produced show its advanced autapomorphic condition (f 7). The maxillary palpi upturned in *Scirpophaga* show its more advanced autapomorphic condition (f8). In *Nymphula* the maxillary palpi highly upturned show its specially more advanced autapomorphic state (f9).

Length of maxillary palpi/eyes (g): Maxillary palpi moderate not more than 2X the eyes in *Nephadosis* and *Scripophaga* show their synapomorphic condition (g1). In *Patissa* and *Schoenobius* the maxillary palpi very large more than 3X the eyes show their advance synapomorphic condition (g2).

Length of maxillary palpi/head length (h): Maxillary palpi about 1.5X the length of head in *Cnaphalocrocis* show its autapomorphic condition (h1). In *Pseudoancylolomia* the maxillary palpi more than 2X the length of head show its advance autapomorphic condition (h2).

Length second segment of maxillary palpi/basal segment (i): Maxillary palpi with 2nd segment about equal to the length of basal segment in *Pempelia* and *Eurodope* show its autapomorphic condition (i1). In *Nephadodes, Scripophaga*, *Patissa* and *Schoenobius* maxillary palpi with 2nd segment longer than basal segment show its advanced aynapomorphic condition (i2).

Apex of maxillary palpi (j): Apex of third maxillary palpus rounded in *Microstega* and *Nomophila* show their synapomorphic condition (j1). In *Pleuroptya* the apex of 3rd segment of maxillary palpus truncated show its autapomorphic condition (j2). The apex of third segment of maxillary palpus apically narrowed in *Ancylolomia uniformella* show its advance autapomorphic condition (j3). In *Ancylolomia chrysographella* the apex of third maxillary segment blunt and truncated show its more advanced autapomorphic condition (j4).

Length third segment of maxillary palpi/second segment (k)**:** Third segment of maxillary palpi always shorter than second segment in *Microstega* to *Paracorsia* show their synapomorphic condition (k1). In *Hymenia* third segment of maxillary palpi slightly longer than second segment show its autapomorphic condition (k2).

Length second segment of maxillary palpi/third segment (l): Second segment of maxillary palpi less than 4X the length of third segment in *Cnaphalocrocis* to *Eurhodope* show their synapomorphic condition (l1). In representatives of the genus *Aglossa* the second segment of maxillary palpi more than 4X the length of third segment show their advanced synapomorphic condition (l2). The second segment of maxillary palpi less than 3X the third segment in *Cnaphalocrocis* to *Pediasia* show their more advance synapomorphic condition (l3). In all three species of *Elophila* the second segment of maxillary palpi much longer than third segment show their further more advance synapomorphic condition (l4). In both species of *Crambus* the second segment of maxillary palpi more than 3X the length of third segment show their specially synapomorphic condition (l5). The second segment of maxillary palpi only slightly longer than third segment in *Nymphula* show its autapomormhic condition (l6) . In *Nomophila* the second segment of maxillary palpi about 1.75X the length of third segment show its advance autapomorphic condition (l7). Second segment of maxillary palpi 2X the length of third segment in *Schoenobius* show its more advance autapomorphic condition (l8). In *Microstega* the second segment of maxillary palpi 2.5X the length of third segment show its further more advance autapomorphic condition (l9). The second segment of maxillary palpi about 3X the length of third segment in *Pseudoancylolomia* show its specially autapomorphic condition (l10). In *Chilotreae* the second segment of maxillary palpi dilated and about 3X the length of third segment show its specially advance autapomorphic condition (l11). The second segment of maxillary palpi about 4X the length of third segment in *Cnaphalocrocis* show its specially more advance autapomorphic condition (l12).

Shape of wings (m): Mesonotal wing usually broad in *Microstega* to *Hymenia* show their synapomorphic condition (m1). In *Cnaphalocrocis* to *Crambus* the mesonotal wings are usually narrowed show their advance synapomorphic condition (m2).

Colour of wings (n): Mesonotal wings with less than five horizontal striations or wings without brilliantly pattern in *Cnaphalocrocis* to *Eurhodope* show their synapomorphic condition (n1). In *Cnaphalocrocis* to *Hymenia* both wings not so brilliantly pattern and mesonotal wings usually less number of patches show their advance synapomorphic condition (n2). Both wings brilliantly pattern with large number of dark spots in *Elophila* to *Nymphula* show their more advance synapomorphic condition (n3). In *Aglossa* mesonotal wings with five horizontal black striations show its autapomorphic condition (n4).

Anterior margin of mesonotal wings (o): The anterior margin of mesonotal wings convex in *Chilotreae* and *Chilo* show their synapomorphic condition (o1). In *Cnaphalocrocis*, *Pseudoancylolomia* and *Ancylolomia* the anterior margin of mesonotal wings sinunated show their advance synapomorphic condition (o2).

Position of veins in mesonotal wings (p): Mesonotal wings with one to three veins unite or stalked in *Cnaphalocrocis* to *Chrysoteuchia* show their synapomorphic condition (p1). In *Pediasia* mesonotal wings with all veins isolated show its autapomorphic condition (p2).

Position of Sc and R1 in mesonotal wings (q): Mesonotal wings with veins Sc and R1 parallel to each other in *Cnaphalocrosis* and *Pseudoancylolomia* show their synapomorphic condition (q1). In both species of *Ancylolomia* veins Sc and R1 in mesonotal wings either close or unite by cross vein at middle show their advance synapomorphic condition (q2). Mesonotal wings with veins Sc and R1 isolated or medially touching then isolated in *Nephadosis* and *Scripophaga* show their more advance synapomorphic condition (q3). In both species of *Nephadoses* mesonotal wings with veins Sc and R1 medially touches but not fused show their further more advance snapomorphic condition (q4). Mesonotal wings with veins Sc and R1 unite by a cross vein in *Patissa* and *Schoenobius* show their specially advance synapomorphic condition (q5).

Position of veins R2 and R3 in mesonotal wings (r): Mesonotal wings with veins R2 and R3 unite and arised from below upper angle of cell in *Microstega* show its autapomorphic condition (r1). In *Pempelia* mesonotal wings with veins R2 and R3 largely stalked and arise from below upper angle of cell show its advance autapomorphic condition (r2). Mesonotal wings with veins R2 and R3 largely stalked, unite with R4 and arise from upper angle of cell in *Nomophila* show its more advance autapomorphic condition (r3). In *Elophila kamali* the veins R2 and R3 of mesonotal wings stalked, further stalked with R4, unite with R5 and arise from upper angle of cell show its further more advance autapomorphic condition (r4). Mesonotal wings with veins R2 and R3 shortly stalked, further stalked with R1 and arise far beyond upper angle of cell in *Patissa* show its special advance autapomorphic condition (r5). In *Schoenobius* the mesonotal wings with veins R2 and R3 largely stalked and arise just below upper angle of cell show its specially more advance autapomorphic condition (r6).

Position of veins R3 and R4 in mesonotal wings (s): Mesonotal wings with veins R3 and R4 unite or only R4 arises from upper angle of cell in *Elophila nymphaeta* and *Elophila diffualis* show their synapomorphic condition (s1). In *Paralipsa* the mesonotal wings with veins R3 and R4 isolated and R3 arise from upper angle of cell show its autapomorphic condition (s2). The mesonotal wings with veins R3 and R4 unite and arise from upper angle of cell in *Calamotropha* show its advance autapomorphic condition (s3). In *Crambus perlella* the mesonotal wings with veins R3 and R4 unite and arise from just below upper angle of cell show its more advance autapomorphic condition (s4). The mesonotal wings with veins R3 and R4 shortly stalked and arise from upper angle of cell in *Cnaphalocrocis* show its further more advance autapomorphic condition (s5). In *Pseudoancylolomia* the mesonotal wings with veins R3 and R4 largely stalked, unite with R5 and arise from upper angle of cell show its specially advance autapomorphic condition (s6).

Position of viens R4 or R5 in mesonotal wings (t): Mesonotal wings with vien R4 arise from upper angle of cell in *Microstega, Nomophila* and *Pleuroptya* show their synapomorphic condition (t1). In *Diaphania* the mesonotal wings with vein R5 arise from upper angle of cell show its autapomorphic condition (t2).

Anal veins in mesonotal wings (u): Mesonotal wings with one anal vein in *Cnaphalocrocis* to *Chilo* show their synapomorphic condition (u1). In *Paralipsa, Calamotropha* and *Chrysoteuchia* mesonotal wings with two anal veins show their advance synapomorphic condition (u2).

Shape of metanotal wings (v): Hind wigs broad in *Pempelia* and *Eurhodope* show their synapomorphic condition (v1). In *Nephadoses, Scirpophaga, Patissa* and *Schoenobius* the metanotal wings narrowed show their advance synapomorphic condition (v2).

Anterior margin of metanotal wings (w): Anterior margin of metanotal wings convex in *Ancylolomia uniformella* show its autapomorphic condition (w1). In *Ancylolomia chrysographella* the anterior margin of metanotal wings sinunated show its advance autapomorphic condition (w2).

Position of veins Sc+R1 in metanotal wings (x): Metanotal wing with veins Sc+R1 isolated in *Microstega, Nomophila, Pleuroptya* and *Diaphania* show their synapomorphic condition (x1). In *Pempelia* the metanotal wings with veins Sc+R1 parallel to Rs show its autapomorphic condition(x2). The metanotal wings with veins Sc+R1 stalked with Rs in *Eurhodope* show its advance autapomorphic condition (x3). In *Chilotreae* the veins Sc+R1 of metanotal wings largely stalked with Rs show its more advance autapomorphic condition (x4). The metanotal wings with veins Sc+R1 unite with Rs by a cross vien in *Chilo* show its further more advance autapomorphic condition (x5). In *Calamotropha* the metanotal wings with veins Sc+R1 stalked with Rs and arise just below upper angle of cell show its specially autapomorphic condition (x6).The metanotal wings with veins Sc+R1 largely stalked and arise far beyond upper angle of cell in *Paralipsa* show its specially advance autapomorphic condition (x7). In *Paracorsia* the metanotal wings with veins Sc+R1 stalked with Rs and arise from beyond upper angle of cell show its specially more advance autapomormhic condition (x8). Metanotal wings with veins Sc+R1 stalked with Rs, unite with M1 and arise from upper angle of cell in *Crambus pakistanica* show its specially further more advance autapomorphic condition (x9).

Position of veins Rs and M1 in metanotal wings (y): Metanotal wings with veins Rs and M1 unite and arise from upper angle of cell in *Microstega, Nomophila* and *Pleuroptya* show their synapomorphic condition (y1). In *Elophila nymphaeta* and *E. diffualis* the metanotal wings with veins either Rs or M1 arise from upper angle of cell show its advance synapomorphic condition (y2). Metanotal wings with veins Rs and M1 stalked and unite with M2 and arise from upper angle of call in *Elophila kamali* show its autapomorphic condition (y3). In *Crambus perlella* the metanotal wings with Rs and M1 stalked and arise from upper angle of cell show its advance autapomorphic condition (y4). The metanotal wings with veins Rs and M1 largely stalked in *Diapania* show its more advance autapomorphic condition (y5).

Position of veins M2 and M3 in metanotal wings (z): Metanotal wings with veins M2 and M3 isolated and M3 arises from lower angle of cell in *Microstega* and *Nomophila* show their synapomorphic condition (z1). In *Cnaphalocrocis* and *Pseudoancylolmia* the metanotal wing with veins M2 and M3 isolated show their advanced synapomorphic condition (z2). The metanotal wings with veins M2 and M3 unite in both species of *Ancylolomia* show their more advance synapomorphic condition (z3). In *Paralipsa and Calamotropha* the metanotal wings with vein M1 arises from upper angle of cell show their further more advance synapomorphic condition (z4). The metanotal wings with vein M3 arises from upper angle of cell in *Eurhodope* show its autapomorphic condition (z5). In *Chrysoteuchia* the metanotal wings with veins M1 and M2 unite and arise from upper angle of cell show its advance autapomorphic condition (z6). The metanotal wings with veins M2 and M3 isolated and M3 arise from lower angle of cell in *Calamotropha* show its more advance autapomormhic condition (z7). In *Schoenobius* the metanotal wings with veins M2 and M3 wide apart show its further more advance autapomorphic condition (z8). The metanotal wings with veins M2 and M3 unite and arise from lower angle of cell in *Patissa* show its specially advance autapomorphic condition (z9).

Postion of vein Cu1 in metanotal wings (za): Metanotal wings with vein Cu1 arises below lower angle of cell in both species of *Nephadoses* show their synapomorphic condition (za1). In *Scripophaga* metanotal wings with vein Cu1 arises from lower angle of cell show its autapomorphic condition (za2).

Anal veins in metanotal wings (zb): Metanotal wings with two or three anal veins in *Microtsega, Nomophila* and *Pleuroptya* show their synapomorphic condition (zb1). In *Microstega* and *Nomophila* metanotal wings with two anal veins found show their advance synapomorphic condition (zb2). Metanotal wings with only one anal vein found in *Elophila kamali* show its autapomorphic condition (zb3).

Legs (zc): Legs moderate in *Cnaphalocrocis* to *Crambus* show their synapomorphic condition (zc1). In *Microstega* to *Hymenia* legs are long show their advance synapomorphic condition (zc2).

Tympanal organs (zd): Tympanal organs wanting at base of abdomen in all the representatives of the family Thyradidae show their synapomorphic condition (zd1). In all the representative of family Pyralidae the tympanal organs found at base of abdomen show their advance synapomorphic condition (zd2).

Shape of herpagon (ze): Herpagon of different shape in *Cnaphalocrocis* to *Eurhodope* show their synapomorphic condition (ze1). In *Microstega* to *Paracorsia* the herpagon are simple flappe-shaped show their advance synapomorphic condition (ze2). Herpagon are F-shaped in *Aglossa* show its autapomorphic condition (ze3).

Apex of herpagon (zf): Apex of herpagon lobe-like in *Microstega, Nomophila* and *Pleuroptya* show their synapomorphic condition (zf1). In *Elophila nympheata* apex of herpagon narrowly rounded show its autapomorphic condition (zf2). Apex of herpagon sub-roundly produced in *Nephadoses neogilveberbis* show its advance autapomorphic condition (zf3). In *Nephadosis gilveberbis* the apex of herpagon truncately produce show its more advance autapomorphic condition (zf4). The apex of herpagon broad , dagger-shaped in *Elophila diffualis* show its further more advance autapomorphic condition (zf5). In *Diaphania* the apex of herpagon hood-shaped show its specially advance autapomorphic condition (zf6).

Inner margin of herpagon (zg): Herpagon with inner margin entire and smooth in *Cnaphalocrocis* to *Chrysoteuchia* show their synapomorphic condition (zg1). In *Chilotreae* the inner lobe of herpagon broadly blunt show its autapomorphic condition (zg2). The inner lobe of herpagon sharply acute in *Chilo* show its advance autapomorphic condition (zg3). In *Pediasia* herpagon with a lunar-shaped process beset with thick scales at inner margin show its more advance autapomorphic condition (zg4).

Shape and structure of herpagon (zh): Herpagon with two thorn-like processes in *Paralipsa* and *Calamotropha* show its synapomorphic condition (zh1). In *Chrysoteuchia* herpagon with a large spine-like process with anchor-shaped apex show its autapomorphic condition (zh2). Herpagon narrowed, apex broad with a tubercle at inner margin in *Crambus perlella* show its advance autapomorphic condition (zh3). In *Crambus pakistanica* the herpagon broad, apex narrowed with two tubercles at inner margin show its more advance autapomorphic condition (zh4). Herpagon typically bilobed, each lobe with a thorn-like process in *Hymenia* show its further more advance autapomorphic condition (zh5).

Apex of uncus (zi): Apex of uncus either sharply pointed or blunt in *Elophila nymphaeta* and *Elophila diffualis* show their synapomorphic condition (zi1). In *Elophila diffualis* apex of uncus blunt beset with hairs show its autapomorphic condition (zi2). Apex of uncus pointed in *Chilo* show its advance autapomorphic condition (zi3). In *Elophila nymphaeta* apex of uncus sharply pointed show its more advance autapomorphic condition (zi4). Apex of uncus truncated in *Elophila kamali* show its further more advance autapomorphic condition (zi5).

Size of uncus and gnathos (zj): Uncus much shorter than membranous gnathos in *Paralipsa*, *Calamotropha* and *Chrysoteuchia* show their synapomorphic condition (zj1). In *Cnaphalocrocis* to *Chilo* the uncus and gnathos sclerotized about equal in length show their advance synapomorphic condition (zj2). Uncus slightly shorter than gnathos in *Microstega* and *Nomophila* show their more advance synapomorphic condition (zj3). Uncus and gnathos equal in length, gnathos dorsally curved in *Nephadoses neogilviberbis* show its autapomorphic condition (zj4). In *Pleuroptya* uncus much shorter than gnathos show its advance autapomorphic condition (zj5). Uncus much longer than gnathos, gnathos ventrally curved in *Nephadoses gilverbis* show its more advance autapomorphic condition (zj6).

Dorso-median surface of uncus (zk): Dorso-median surface of uncus tuberculated in *Ancylolomia chrysographela* of show its autapomorphic condition (zk1). In *Ancylolomia uniformalis* the dorso-median surface of uncus largely produced forming Y-shaped structure show its advance autapomorphic condition (zk2).

Theca (zl): Theca unilobed in *Cnaphalocrocis*, *Pseudoancylolomia* and *Ancylolomia* show their synapomorphic condition (zl1). In *Chilotreae* and *Chilo* theca bilobed show their advance synapomorphic comdition (zl2). Theca with lobe-like thecal appendage in *Elophila nymphaeta* show its autapomorphic condition (zl3). In *Elophila diffualis* theca with knob-like thecal appendage show its advance autapomorphic condition (zl4). Theca with sharply pointed thorn-like thecal appendage in *Ancylolomia chrysographela* show its more advance autapomormhic condition (zl5). In *Ancylolomia uniformalis* theca with sharply pointed beak-like thecal appendage show its further more advance autapomormhic condition (zl6).

Membranous conjunctiva (zm): Membranous conjunctiva with tubercle-like or series of small spine-like cornuti in *Cnaphalocrocis* to *Chrysoteuchia* show their synapomorphic condition (zm1). In *Microstega* to *Diaphania* membranous conjunctiva with one knob-like or without cornuti show their advance synapomorphic condition (zm2). Membranous conjunctiva with a series of spine-like cornuti in *Paralipsa* and *Calamotropha* show their more advance synapomorphic condition (zm3). In *Chrysoteuchia* the membranous conjunctiva with a finger-like corniti show its autapomormhic condition (zm4). Membranous conjunctiva with a series of minute cornuti in *Crambus pakistanica* show its advance autapomormhic condition (zm5). In *Schoenobius* membranous conjunctiva with a thorn like blunt cornuti show its more advance autapomormhic condition (zm6). The membranous conjunctiva with two thorn-like cornuti in *Crambus perlella* show its further more advance autapomorphic condition (zm7). In *Paracorsia* the membranous conjunctiva with a pair of large thorn-like cornuti show its specially advance autapomormhic condition (zm8). Membranous conjunctiva with lunar-shaped cornuti in *Patissa* show its specially more advance autapomormhic condition (zm9). In *Pediasia* the membranous conjunctiva with a pair of lunar-shaped cornuti beset with small spines show its specialy further more advance autapomormhic condition (zm10).

Both apophysesses (zn): Both apophysesses smooth or with short tubercles in *Cnaphalocrocis* to *Chrysoteuchia* show their synapomorphic condition (zn1). In *Pediasia* both apophysesses with thorn-like tubercles show its autapomormhic condition (zn2).

Apophysses anterior (zo): Apophysses anterior entire with apex blunt in *Paralipsa* show its autapomorphic condition (zo1). In *Calamotropha* the apophysses anterior with a large spine-like tubercle nearly acute apex show its advance autapomormhic condition (zo2).

Apophysses posterior (zp): Apophysses posterior medially dilated in *Nephadoses neogilverbis* show its autapomormhic condition (zp1). In *Nephadoses gilviberbis* the apophysses posterior gradually narrowed towards apex show its advance autapomormhic condition (zp2). Apex of apophysses posterior blunt in *Scripophaga* show its more advance autapomormhic condition (zp3).

Length of apophysses anterior/posterior (zq): Both apophysesses are about equal in length in *Paralipsa* and *Calamotropha* show their synapomorphic condition (zq1). In *Chrysoteuchia* apophysses anterior about 2X the length of apophysses posterior show its autapomormhic condition (zq2). Inner margin of apophysses anterior entire about 2X the length of apophysses posterior in *Chilo* show its advance autapomormhic condition (zq3). In *Chilotreae* inner basal margin of apophysses anterior with a tubercle about 3X the length of apophysses posterior show its more advance autapomormhic condition (zq4).

C. Discussion on Cladogram

The pressent studies of the family Pyralidae comprises 26-genera and 30-species from Pakistan play sister group relationship to each other by their synapomorphies like proboscis smooth at base (d1) and body usually light or dull colour (b1). Among all the representative of the family Pyralidae the *Aglossa* plays sister group relationships with 25-genera by their synapomorphies like, proboscis with scales at base (d2), maxillary palpi well developed (e2) and tympanal organs found at base (d2) and out group relationships by its autamorphies like second segment of maxillary palpi more than 4X the length of third segment (l2), mesonotal wings with five horizontal black striations (n4) and herpagon F-shaped (ze3).

The rest of the 25-genera and 29-species fall into two groups, the first group includes six genera and seven species play sister group relation ship with second group comprising 18-genera and 22-species by their synapomorphies like second segment of maxillary palpi less than 4X the length of third segment (P1), mesonotal wings with less than five horizontal striations or wings not brilliantly pattern (n1) and herpagon are of different shape (ze1) and out group relationship by their synapomophy proboscis absent or minute (d4).

The first group includes *Nephadosis*, *Scripophaga*, *Patissa*, *Schoenobius*, *Pempelia* and *Eurhodope*, in which first four genera play sister group relationship to each other by their synapomorphies like maxillary palpi with second segment longer than basal segment (l2) and metanotal wings narrow (v2) and out group relationship with *Pempelia* and *Eurhodope* by their synapomorphies like second segment of maxillary palpi about equal to basal segment (i1) and metanotal wings broad (v1). In rest of the genera the two species of the genus *Nephadoses* and *Scripophaga* play sister group relationship to each other by their synapomorphies like, maxillary palpi moderate not more than 2X the eyes (g1) and mesonotal wings with veins Sc and R1 isolated or medially touching then isolated (q3) and out group relationship with *Patissa* and *Schoenobius* by their synapomorphies like, frons anteriorly conically produced (c5), maxillary palpi very large more than 3X the eyes (g2) and mesonotal wings with veins Sc and R1 unite by a cross vein (q5).

Among 18-genera, the 16-genera *Cnaphalocrocis* to *Hymenia* plays sister group relationship to each by their synapomorphy, both wings brilliantly patterned with large number of dark patches (n3). The species of *Elophila* play sister group relationship with each other by their synapomorphies like maxillary palpi anteriorly directed or slightly oblique (f3) and second segment of maxillary palpi much longer than third segment (l4) and out group relationship with *Nymphuta* by its autapomorphies like, maxillary palpi slightly upturned (f9) and second segment, of maxillary palpi only slightly longer than third segment (l6).

Among three species of *Elophila* the *E. nymphaeta* and *E. diffualis* play sister group relationship to each other by their synapomorphies like mesonotal wings with veins R3 and R4 unite or only R4 arising from upper angle of cell (s1), metanotal wings with veins Rs and M1 arise from upper angle of cell (y2) and apex of uncus either sharply pointed or blunt (zi1) and out group relationship with *E. kamali* by its autapomorphies like mesonotal wings with veins R2 and R3 stalked, further stalked with R4 and unite with R5 and arise from upper angle of cell (r4), metanotal wings with veins Rs and M1 stalked and unite with M2 and arise from upper angle of cell (y3), metanotal wings with only one anal vein is found (zb3) and apex of uncus truncated (zi5).

The rest of the sixteen genera from *Cnaphalocrocis* to *Hymenia* further divided into two sub-groups, the first sub-group includes ten genera and second sub-group includes six genera. Among first sub-group the genera from *Cnaphalocrocis* to *Pediasia* play sister group relationship to each other by their synapomorphies like palpi porect and anteriorly directed (f4) and second segment of maxillary palpi less than 3X the third segment (l3) and out group relationship with *Crambus* by its synapomorphies palpi obliquely turned (f5) and second segment of maxillary palpi more than 3X the third segment (l5).

Among rest of the nine genera, the *Cnaphalocrocis* to *Chrysoteuchia* play sister group relationship to each other by their synapomorphies like mesonotal wings with 1-3 veins unite or stalked (p1) and both apophysesses smooth or with short tubercles (zn1) and out group relationship with *Pediasia* by its autapomorphies like mesonotal wings with all veins isolated (p2) and both apophysesses with thorn-like tubercles (zn2). In rest of the genera the *Cnaphalocrocis, Pseudoancylolomia, Ancylolomia, Chilotreae* and *Chilo* play sister group relationship with each other by their synapomorphies like frons usually conically produced anteriad (c3) and uncus and gnathos sclerotized about equal in length (zj2) and out group relationship with *Paralipsa, Calamotropha* and *Chrysoteuchia* like frons rounded (c2) and uncus much shorter than membranous gnathos (zj1). In these genera the *Paralipsa* and *Calamotropha* play sister group relationship with each other by their synapomorphies like metanotal wings with vein M1 arises from upper angle of cell (z4) and herpagon with two thorn-like process (zh1) and out group relationship with *Chrysoteuchia* by its autapomorphies like herpagon with a large spine-like process with anchor-shaped apex (zh2) and apophysses anterior about 2X the apophysses posterior (zq2). Among *Cnaphalocrocis, Pseudoancylolomia, Ancylolomia, Chilotraea* and *Chilo*, the first three genera play sister group relationship to each other by their synapomorphies like anterior margin of mesonotal wings sinuated (o2) and theca unilobed (zl1) and out group relationship with *Chilotraea* and *Chilo* by their synapomorphies like anterior margin of mesonotal wings convex (o1) and theca bilobed (zl2).

The *Cnaphalocrocis* and *Pseudoancylolomia* play sister group relationship with each other by their synapomorphies like proboscis minute (d5) and mesonotal wings with veins Sc and R1 parallel to each other and out group relationship with two species of *Ancylolomia* by their synapomorphies like proboscis wanting (d6) and metanotal wings with veins M2 and M3 unite (z3).

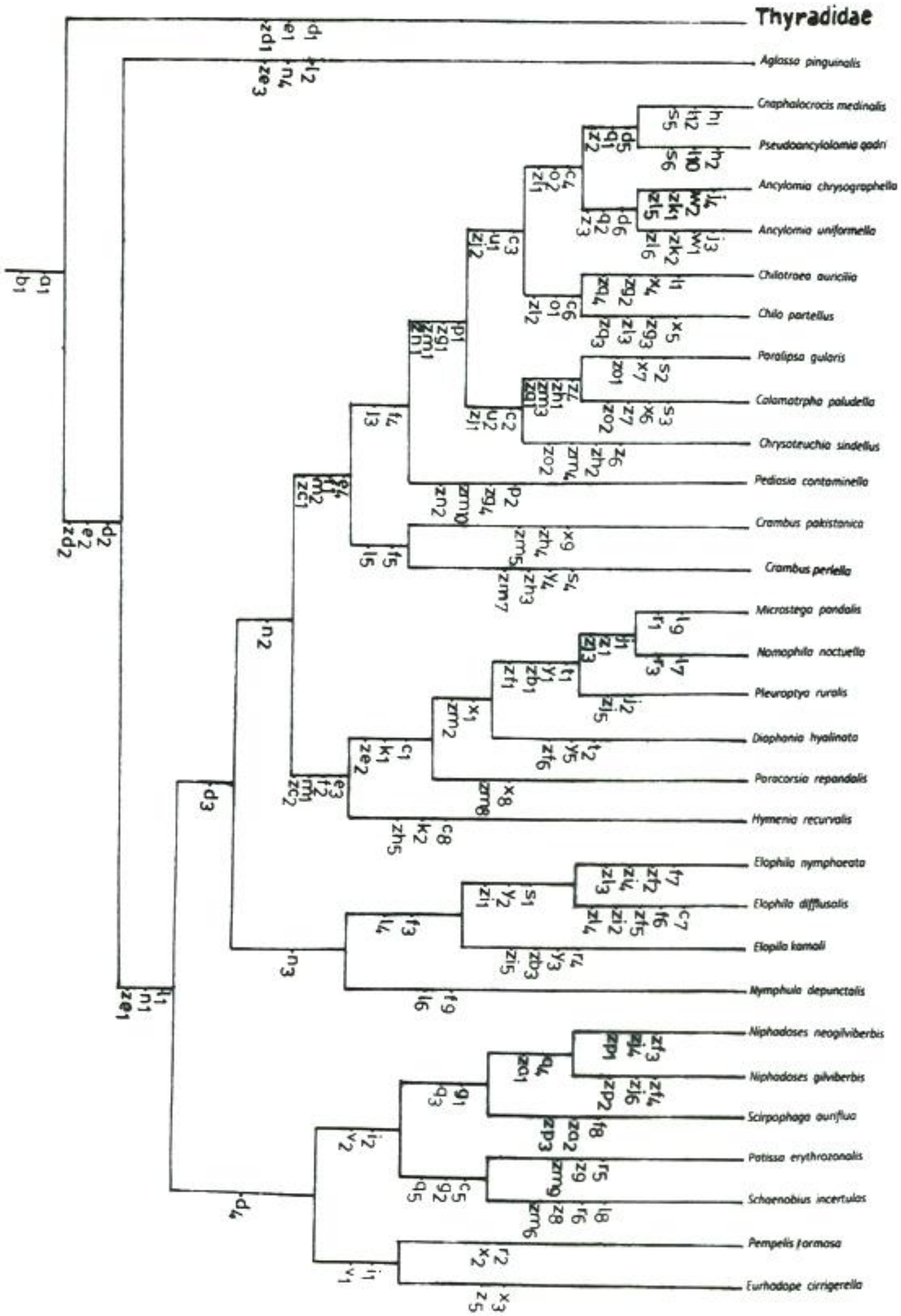

Fig.1. Cladistic analysis of pyralidspeeies from pakistan

The second sub-group comprises *Microstega, Nomophila, Pleuroptya, Diaphania, Paracorsia* and *Hymenia*, in which the first five genera play sister group relationship with each other by their synapomorphies like third segment of maxillary palpi always shorter than second segment (k1) and herpagon simple flapper-shaped (ze2) and out group relationship with *Hymenia* by its autapomorphies like third segment of maxillary palpi slightly longer than second segment (k2) and herpagon typical bilobed , each lobe with a thorn-like process (zh5).

In rest of the genera *Microstega, Nomophila, Pleuroptya* and *Diaphania* play sister group relationship to each other by their synapomorphies like metanotal wings with veins Sc+R1 isolated to each other (x1) and membranous conjunctiva with one knob-like cornuti or without cornuti (zm2) and outgroup relation ship with *Paracorsia* by its autapomorphies like metanotal wings with viens Sc+R1 stalked with Rs and arise from upper angle of cell (x8) and membranous conjunctiva with a pair of large thorn-like cornuti (zm8). Among *Microstega, Nomophila, Pleuroptya* and *Diaphania t*he first three genera play sister group relationship with each other by their synapomorphies like mesonotal wings with vein R4 arises from upper angle of cell (t1) and apex or herpagon lobe-like (zf1) and out group relationship with *Diaphania* by its autapomorphies like mesonotal wings with vein R5 arises from upper angle of cell (t2) and metanotal wings with viens Rs and M1 largely stalked (y5). The genera *Microstega* and *Nomophila* play sister group relationship to each other by their synapomorphies like apex of third maxillary palpi rounded (j1) and uncus slightly shorter than gnathos (zj3) and out group relationship with *Pleuroptya* by its autapomorphies like apex of third maxillary palpi truncated (j2) and uncus much shorter than gnathos (zj5).

Reference

Brower, A, Y. Z. (2000). Phylognetic relationship among the Nympalidae (Lepodoptera) inferred from partial sequences of the wingless gene, *Proc. R. Soc. Lon. B*: 1201-1211.

De camargo, A. H. A., Mielke, O. H. H. And Casogrande, M. M. (2009), Cladistic analysis of the sub-family Arsenurine (Lepisoptera: Saturniidae) based on adult morphology. *Zootaza 2218:* 1-34.

Emerson, B. C., Wallis, G. P. and Patricks, B. H. (1997). Biogeographic area relationship in southern NewZealand, A cladistic analysis of Lepidoptera destruction. *Journal of Biogeograhphy 24:* 89-99.

Kamaluddin, S., Ahmed, I. and Ahmad, S. (1997). A review and cladistic analysis of Lymantrid genera (Lepidoptera: Noctuidae) from Pakistan and adjoining area, *Proc. Pakistan Cong. Zool, 17:* 271-279.

Kamaluddin, S., Ahmed, and Haq, E. (1999). Cladistic analysis, key to the genera and distributional rages of sphingidae of Pakistan. *Proc. Pakistan Cong. Zool, 19:* 159-172.

Kamaluddin, S. Naz, S. and Shakira (2013a). Cladistic analysis of the sub-family Noctuinae (Lepidoptera: Noctuidae) from Pakistan. *FUUAST J. BIOL.* 3(1): 119-120.

Kamaluddin, S. Shakira and Naz, S. (2013b). Cladistic analysis of the sub-family Plusiinar species (Lepidoptera: Noctuidae) from Pakistan. *FUUAST J. BIOL.* 3(2): 117-128.

Kamaluddin, S. Fatima G. and Ahmed, I. (2000). Cladistic analysis of the sub-family Trifinae (Lepidoptera: Noctuidae) from Indo-Pakistan Sub-Continent. *Proc, Pakistan Congr. Zool. 20*: 181-192.

Kamaluddin,S., Baig , N ., Shakira , Gabol , K. And Yasir , I. (2015). A cladistic analysis of the family Geometridae (Lepidoptera: Heterocera) from Pakistan . *FUUAST J. BIOL* . ,*5*(2):231-242.

Peigler, R. S. (1993). Cladistic analysis of the genera of the sub-family Arsenurinae (Saturnidae). *Journal of the Lepidopterists Society 47*(3): 211-228.