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Data Concerning the Entomological Fauna in Tafat National Forest (North-East of Algeria)

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Abstract- A field survey was undertaken during 2006-2008. Entomological fauna was collected in four forest stations from national forest of Tafat (North-east of Algeria) using a quantitative sampling method. 152 species were found during the current field survey divided into 57 Coleoptera, 35 Hymenoptera, 29 Hemiptera, 18 Diptera and 13 Lepidoptera. Majority of the species collected are polyphagous. The results of the survey of insectes show that the risk on *Quercus ilex* from Tafat forest. To characterize the structure, diversity and dynamic of insect populations were discussed.

Keywords: *Quercus ilex*, survey insects, structure, dynamic, forest, Setif.

INTRODUCTION

The entomolgical fauna of Tafat is unknown. So in first time our objective consist to survey the insects and in second time to try to highlight the role of these insects on the dominate tree *Quercus ilex*. Quercus lex has a remarkable vitality, and an area of distribution is extended throughout the Mediterranean basin, particularly in North of Africa. There is a few research about the insects associated with this tree, Chacali et al (2001), Sayah (2003) and Benia et al., (2004). During the years 2002-2004, the Tafat forest began to show signs of damage mainly on *Q .ilex* because this tree represents 80% of plant population, then we were interested to study the insect fauna of this tree. In this area; to date no studies have been conducted on the vertebrate and invertebrate populations. The present study brings contribution to knowledge of the important insects (Coleoptera, Hymenoptera, Hemiptera, Diptera and Lepidoptera) of this researched area.

MATERIAL AND METHODS

The Tafat national forest is located in the Djebel Tafat situated in the department of Bougaa (North West of the of Setif town). The geographic coordinates of the Tafat forest is 36°16'N and 5 ° 06'E. Forest Tafat presents a North exposition and covers an area of 1950 ha. The landscape is varied, characteristic to calcareous mountains. The minimum altitude is of 600 meters and the maximum one is of 1450 meters. Tafat forest is situated in climatic sub humid. Temperatures and rainfall varied among the years. (Tab1, Fig.1)
Insects were collected in four stations (Tab. 2). The dominant trees species are *Quercus ilex* (80 %) accompanied by *Juniperus oxycedrus*.

The insects were collected monthly from April to July during 2006-2008 as this is the period with the highest prevalence of insects in several trees in the region. We are using a various invertebrate capture techniques: sweep and aerial netting, beating trays, pitfall

trapping, flight intercept traps, light trapping malaise trap, interception net trapping, Winkler extraction nets (Southwood, 1978; Leather, 2005; McGavin 2007)

The collected entomological fauna was determined up to the species or genus level using identification keys (Manuals entomologia ,curso practico de Entomologia by Pujellard et al., (2004), the Immature insects by Chu (1946-1947), Fauna of French vol. IV and VIII by Perrier, (1971), and by the specialists: Coleoptera, Lepidoptera: Pr. Doumandji (Dpt of zoology, ENSA Algiers), for Hymenoptera: Formicidae, Pr. Pujade-Villar (Entomological laboratory, University of Barcelona), for Coleoptera, Dr. Amador Vmolas (Museum of life Sciences of Barcelona), Hemiptera, Dr. Eduardo Mateos (University of Bacelona), Heteroptera: Dr Martha Goula (University of Bacelona), Homoptera: Dr. Nicolas Perez (University of Bacelona).

For each station we have calculated the relative abundance, the frequency in order to establish the species numerical and the structure of constancy classes.

The diversity of the insects was evaluated using Shannon-Weaver and the index of diversity (Daget, 1976; Southwood, 1978). The degree of similarity between the four stations was estimated using index of Jaccard.

Tab.1.

Temperatures during our study during 2006-2008

Année 2006												
mois	Jan	Fev	Mars	Avril	Mai	Juin	Juil	Août	Sept	Oct	Nov	Dec
m	0,7	0,9	0, 5	10	14,6	17,8	20,3	18,4	14,8	13,6	7,1	3,6
M	7,6	9,3	15,9	20,9	25,7	30,7	33,4	32,3	26,2	24,8	16,5	10,6
M+m /2	4,1	5,1	8,2	15,45	20,15	24,25	26,85	25,35	20,5	19,2	11,8	7,1
Année 2007												
mois	Jan	Fev	Mars	Avril	Mai	Juin	Juil	Août	Sept	Oct	Nov	Dec
m	3,2	3,8	3,7	8,4	11,1	17,4	19,7	20,2	15,4	11,7	4,7	2
M	13,5	12,5	12,4	16,4	22,5	30,8	33,7	33,3	27,4	20,5	13,7	9,8
M+m /2	8,35	8,15	8,05	12,4	16,8	24,1	26,7	26,75	21 ;4	16,1	9,2	5,9
Année 2008												
mois	Jan	Fev	Mars	Avril	Mai	Juin	Juil	Août	Sept	Oct	Nov	Dec
m	2,2	3,2	4	7,6	12,4	15,4	20,7	20,2	16,4	11,3	6,2	3
M	12,3	13,2	14	19,3	23,2	28,2	34,7	33,7	26,9	20	14	10
M+m /2	7,25	8,2	9	13,45	17,85	21,8	27,7	26,95	21,65	15,65	10,1	6,5

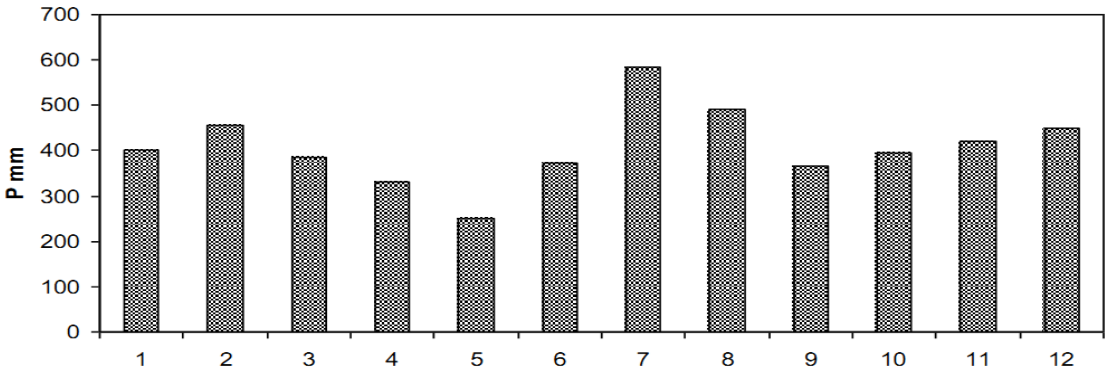

Fig.1. Variation of rainfall from 1997 to 2008

Tab. 2

Characteristic of the stations regularly surveyed in the study

	Station A	Station B	Station C	Station D
Altitude (m)	1267	1050	900	700
Density of Trees	Very dense, 6 trees of *Q.ilex* for 2 trees of *J. oxycedrus*	Trees are of *Q. ilex* for *J. oxycedrus* fairly spacedand 1 tree	Trees are spaced, trees of *J. oxycedrus* are rarely	Trees are rarely
Grazing	Absent	Absent	Absent	Intense
Litter	Very thick	Enough thick	Thick	Absent

RESULTS AND DISCUSSIONS

LIST OF THE PREDOMINANT SPECIES OF INSECTS CAPTURED

During the study, the list of insects belonging to the orders of Coleoptera, Hymenoptera, Hemiptera, Diptera and Lepidoptera captured in Tafat forest represent 9832 individuals belonging to 152 species and 30 genera (Tab.3)

NUMERICAL ABUNDANCE, RELATIVE ABUNDANCE AND THE INSECT'S SPECIES FREQUENCY.

The best order is Hymenoptera with 4629 individuals, followed by Diptera, 1668 and that of Hemiptera is 1416. Although, the number of beetles species so high, the individuals is low 613 and the last order is Lepidoptera with 533 individuals. The number of insects captured in each station is showed in figures 2 and 3. The Station C presented the best number of species than the other stations because this station presented the dense trees and situated at an altitude of 900 meters. However, we noted that the stations B and D presented the trees are spaced wealth have the less number of species. However we noted that the station B (67 species) is richer than the station D (29 species), because it has a completely naked through the woods, grazing is intense. The station C is the best with 92 species and 3216 individuals while the stat ion A presented 80 species and 2802 individuals. Both the stations are similar, contra irately to the stations B and D, but the station B presented a double number of species than the station D, although both stations have the not high density of trees. We noted that the station D it is subject to many factors of degradation.

Tab. 3

List of predominate insects captured from Taffat forest during 2006-2008

Coleoptera	*F : Tenebrionidae*	*Acusta sp*
F : Melolonthidae	*Pimelia interstialis*	*Zygota sp*
Rhizotrogus sp	*Synergus crassicornis*	*Plagiolepis sp*
Rhizotrogus carduorum	*F : Coccinellidae*	*F :Eupelmidae*
Rhizotrogus eleagnus	*Coccinella.quatuordecimpustula*	*Eupelmus seculatus*
F : Curcullionidae	*F : Bostrichidae*	*F :Braconidae*
Otiorrhynchus sp	*Xylopertha sp*	*Apanteles sp*
Sitona sp	*F: Buprestidae*	*Microgaster sp*
Balaninus sp	*Anthaxia sp*	*Taphaeus sp*
Phyllobius oblongus	*Anth.(cratomeris)hungarica*	*Bracon sp*
Attelabus nitens	*Agrilus viridis*	*F :Diapriidae*
Orthotomicus sp	*F : Merycidae*	*Pantoclis sp*
Xyleborus sp	*Ebaeus sp*	*F :Platygastridae*

Xyleborus monographus	*F : Dermestidae*	*Synopeas sp*
F : Melyridae	*Attagenus bifasciatus*	*F :Eumenidae*
Colotes(Homoeodipris) javeti	*Dermestes undulates*	*Eumenes sp*
Dasytes sp	*F : Histeridae*	*F :Ichneumonidae*
Aplocnemus sp	*Hister sp*	*Phygadeuon sp*
Psilotrix sp	*F : Carabidae*	*F :Scellonidae*
F : Anobiidae	*Calosoma inquisitor*	*Telenomus sp*
Ptinus obesus	*Metabletus fuscomaculatus*	*F :Torymidae*
Ptinus sp	*Bembidium sp*	*Monodontomerus sp*
F: Phalacridae	*F : Cetoniidae*	*F : Megachilidae*
Olibrus sp	*Aethiessa floralis*	*Osmia sp*
Phalacrus sp	*F: Cantharidae*	*F :Bethylidae*
F: Staphyllinidae	*Malthinus sp*	*Bethylus sp*
Staphylinus sp	*Malthinus striatulus*	*F :Pompilidae*
Staphylinus olens	*F : Cryptophagidae*	*Priocnemus sp*
Ocypus sp	*Cryptophagus sp*	*F :Ceraphronidae*
Omalium sp	*F : Cerambycidae*	*Aphanogmus sp*
Megarthrus sp	*Cerambyx cerdo*	*F :Orussidae*
F : Chrysomelidae	*F : Latridiidae*	*Orussus taorminensis*
Longitarsus sp	*Corticaria sp*	*F :Cynipidae*
Altica sp	*F :Latridiidae*	*Plagiotrochus ament i*
Clytra novempunctata	*Corticaria sp*	*Plagiotrochu coriaceus*
Clytra sp.	**Hymenoptera**	*Plagiotrochus quercusilicis*
Lachnea vicina	*F :Eurytomidae*	*Plagiotrochus yeusei*
Psylliodes sp	*Sycophila binotata*	*Plagiotrochus gibbosus*
Chaetocnema sp	*F :Pteromalidae*	*Plagiotrochus vilageliui*
F : Leiodidae	*Mesopolobus lichtensteini*	*Plagiotrochus razeti*
Catops coracinus	*F :Eulophidae*	*Synergus clandestinus*
Catops erro	*Necremnus sp*	*Synergus crassicornis*
F : Scarabaeidae	*Crysocharis sp*	*Saphonicrus lusatinicus*
Scarabeus cicatricosus	*F :Formicidae*	**Lepidoptera**
Cetonia funeraria	*Crematogaster scutellaris*	*F :Lymantriidae*
Geotrupes leavigatus	*Camponotus sp*	*Lymantria dispar*

F :Tortricidae	*F : Dolichopodidae*	*F :Diaspidiidae*
Tortrix viridana	*Sciapus sp*	*Lipidosaphes ulmi*
F :Pieridae	*F :Sarcophagidae*	*Chionaspis salicis*
Pieris brassicae	*Sarcophaga sp1*	
Pieris rapae	*Sarcophaga sp2*	
Gonepteryx cleopatra	**Hemiptera (Heteroptera)**	
Collias croceus	*F :Anthocoridae*	
F :Nympha idae	*Anthocoris nemorum*	
Vanessa cardui	*F :Lygaeidae*	
Vanessa polychloros	*Spilostethus pandurus*	
F :Lycaenidae	*Spilostethus militaris*	
Plebejus argus	*Lygaeus saxatilis*	
F :Geometridae	*Lygaeus equestris*	
Carcina quercana	*F :Stenocephalidae*	
Scopula sp	*Dicranocephalus agilis*	
F :Lychocolletidae	*F :Coreidae*	
Phyllonorycter pseudojoviella	*Coreomeris denticulatus*	
F :Papillionidae	*Syromastus rhombeus*	
Iphiclides podalirius	*F :Nabiidae*	
Diptera	*Himacerus (Aptus) mirmicoides*	

F :Hybotidae	*F :Microphysidae*	
Platypalpus sp	*Loricula (Loricula) freyi*	
F :Tipulidae	*F :Berytidae*	
Tipula sp	*Berytinus nortiragus*	
F :Heleomyzidae	**Hemiptera (Homoptera)**	
Suillia variegata	*F :Aphididae*	
Suillia sp	*Lachnus roboris*	
F :Empididae	*Cinara sp*	
Rhamphomyia sp	*Pterochloroides persicae*	
Empis sp	*Hyperomyzus lactucae*	
F :Drosophylidae	*Diuraphis noxia*	
Cantarinia ilicis	*Rhopalosiphum padi*	
F :Cecidomyidae	*Wahlgreniella nervata*	
Dryomyia lichtensteini	*Paracletus sp*	
F :Muscidae	*Thelaxes sp*	
Musca sp1	*F :Cicadellidae*	
Musca sp2	*Eupteryx sp*	
F :Calliphoridae	*Cicadella viridis*	
Calliphora sp	*Epiptera europea*	
F :Sciomycidae	*F :Issidae*	
Salticella sp	*Issus coleoptratus*	
F : Bibionidae	*F :Kermesidae*	
Dilophus sp	*Kermococcus roboris*	
Bibio hortulanus	*Pseudococcus sp*	
F :Syrphidae	*F :Aleyrodidae*	
Eupeodes corollae	*Aleurodes sp*	

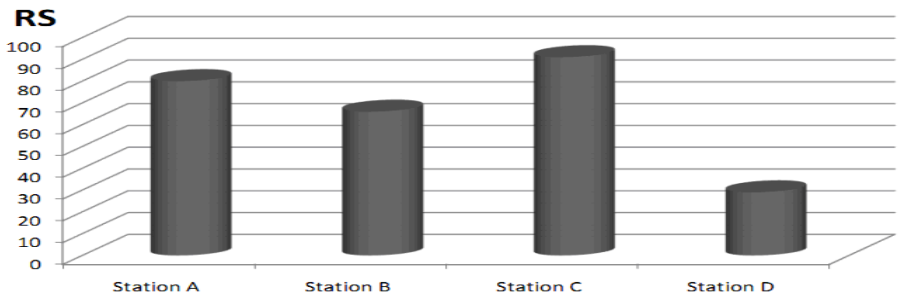

Fig.2. Number of species of insects captured in the stations study during 2006-2008

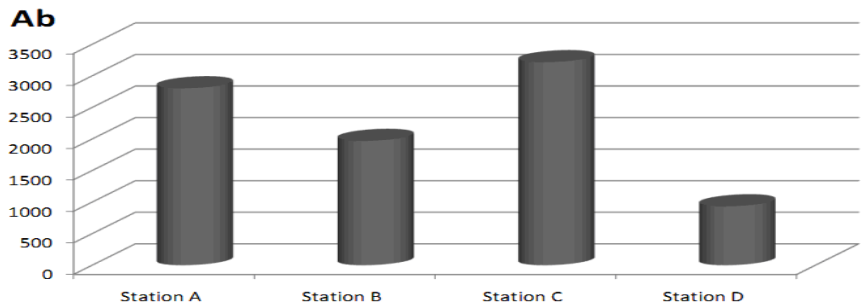

Fig. 3. Number of individual of insects captured in the stations study during 2006-2008

STRUCTURE OF ENTOMOLOGICAL FAUNA FROM TAFAT FOREST

Analysing the structure of the insects from Tafat forest, it was noticed that four species were dominant and the most species were sporadic (Benia et al, 2010). Constant species classes are not present from the stations B and D because both stations are clearings and the wind has the negative role on insects. At the station A we noted four constantly species: *Plagiolepis sp, Lachnus roboris, Pterochloroides persicae* and *Kermococcus roboris*, so the station C presented only one constantly species: *Xylopertha sp*. The fundamental species class *Mesopolobus lichtensteini* (Hymenoptera) and *Dryomyia lichtensteini* (Diptera) are found in stations A, B, C (Tab.4). These two species characterized the damage on the tree *Q. ilex L.* with wrong leaf format (galling) due to the action of these two species (Benia et al, 2010).

Tab.4

The structure of the species classes of the dominant insects from Tafat forest

Station / Classes of insects	A	B	C	D
Dominant	*M.lichtensteini* *C.scutellaris* *Camponotus sp* *Pseudococcus sp* *D.lichtensteini*	*M.lichtensteini* *D.lichtensteini*	*M.lichtensteini* *C.scutellaris* *Pseudococcus sp* *D.lichtensteini*	
Constant	*Plagiolepis sp* *Lachnus roboris* *P. persicae* *K. roboris*		*Xylopertha sp*	
Accessory	21	10	17	7
Sporadic	50	55	70	22

THE SIMILARITY OF THE STUDIED INSECTS FROM TAFAT FOREST

According to the index of Jaccard, we noted that the highest rate is observed between station A and B (0.528). We can distinguish two groups of species (Fig.4). One group is belonging to the stations A, B and C (0.456) and the second group belonging to the station D (0.227). The lower similarity between the stations are due to multiple reason, the stations A, B and C presented the same microclimatic, fauna and floristic and these stations are situated at different altitude. These reasons can affected the similarity of the insects populations from the studied stations (Mouna, 1982)

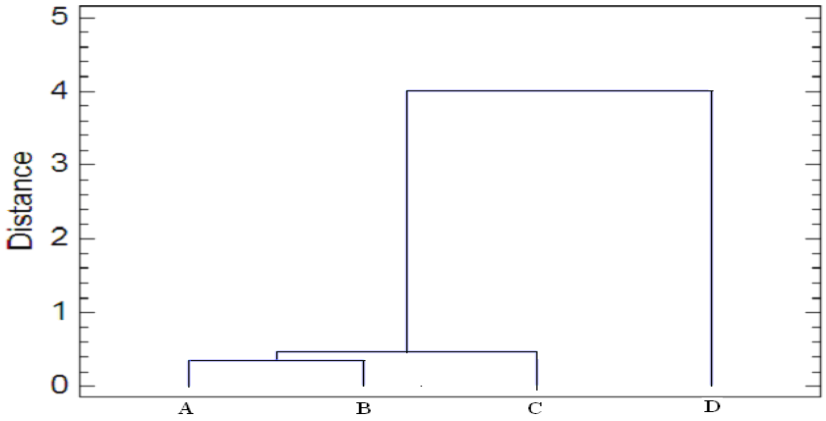

Fig. 4. Dendrogramm of similary by Jaccard index

THE SPECIES RICHNESS

The Shannon-Weaver index of diversity has high values in all stations study (Tab.5). The maximum theoretical values of the Shannon-Weaver index Shannon-Weaver index of diversity is noted for the insects from station C (4.51) witch the most numerical species and individuals are captured.

Tab.5

Composition and structure of insects in the stations study

Stations	Shannon-Weaver index of diversity (H)	theoretical diversity (H' max)	Evenness (E) = (H) / (H max)
Station A	2.679	4.382	0.611
Station B	2.703	4.189	0.645
Station C	2.637	4.510	0.584
Station D	2.133	3.367	0.633

DYNAMICS OF ECOLOGICAL INDEX DURING 2006-2008

Analyzing the variation of the numerical abundance of the insects, we have noticed that the largest number of individuals from bee was captured during May-June period. The low values of the numerical abundance during summer, could be explained by the interaction species phenology and the limiting microclimatic factors (temperature, humidity) on the insects species. The climate factors exert a direct influence on insects' development, and an indirect one, on their food resources. The index of diversity varied from one collecting period to another, for each station study. We have noticed a decrease of diversity determined by the decreasing species and their numerical number abundances (Tab.6).

Tab. 6

Dynamics of ecological index during 2006-2008 in the station study from Tafat forest

year 2006						
Stations	Period of the study	No of species	Abundance	The Shannon-Weaver index of diversity (H)	The theoretical diversity (H max)	Evenness (E)
A	April	3	38	1.064	1.098	0.969
	May	9	98	1.880	2.197	0.855
	June	11	287	2.061	2.397	0.859
	July	3	27	0.988	1.098	0.900
B	April	3	10	1.054	1.098	0.960
	May	7	97	1.640	1.945	0.842
	June	8	163	1.837	2.079	0.883
	July	2	14	0.598	0.693	0.863
C	April	3	34	1.082	1.098	0.985
	May	10	157	2.114	2.302	0.918
	June	13	303	2.295	2.564	0.894
	July	4	36	1.126	1.386	0.812
D	April	1	3	0	0	/
	May	3	18	1.060	1.098	0.956
	June	5	97	1.503	1.609	0.934
	July	2	11	0.655	0.693	0.945

year 2007						
Stations	Period of the study	No of species	Abundance	The Shannon-Weaver index of diversity (H)	The theoretical diversity (Hmax)	Evenness (E)
A	April	4	109	1.050	1.386	0.757
	May	12	211	2.248	2.484	0.905
	June	15	387	2.276	2.708	0.840
	July	4	55	0.850	1.386	0.613
B	April	7	83	1.678	1.945	0.862
	May	6	97	1.572	1.791	0.877
	June	9	247	1.866	2.197	0.849
	July	2	22	0.398	0.693	0.574
C	April	9	131	2.083	2.197	0.948
	May	13	349	2.424	2.564	0.945
	June	9	307	2.087	2.197	0.949
	July	2	35	0.692	0.693	0.999
D	April	1	27	0	0	/
	May	3	97	0.953	1.098	0.867
	June	5	171	1.038	1.609	0.644
	July	1	9	0	0	/

Continued

year 2008						
Stations	Period of the study	No of species	Abundance	The Shannon-Weaver index of diversity	The theoretical diversity (H max)	Evenness (E)
A	April	11	104	2.100	2.397	0.876
	May	23	494	2.377	3.135	0.758
	June	34	1362	2.549	3.526	0.722
	July	8	211	2.023	2.079	0.973
B	April	10	106	2.017	2.302	0.876
	May	16	393	2.088	2.772	0.753
	June	23	1023	2.288	3.135	0.729
	July	5	71	0.982	1.386	0.708
C	April	10	78	2.147	2.302	0.932
	May	28	728	2.468	3.332	0.740
	June	41	1430	2.455	3.713	0.661
	July	6	44	1.679	1.791	0.937
D	April	3	52	0.431	1.098	0.392
	May	8	191	1.429	2.079	0.687
	June	10	306	1.685	2.302	0.731
	July	4	32	1.166	1.386	0.841

CONCLUSION

The analysis of results allows us to suggest that the richness specific are closely related with the diversity of vegetation and environmental conditions in stations study. The dynamics of the specific richness and numeral of individuals during 2006-2008 shows that the most number of species and individuals is noted at the end of the spring and early of the summer. Many devastating phyllophagous species are captured case of *Tortrix viridana* of *Attelabus nitens* of *Clytra novempunctata* and all beetles. Indeed the majority of species are galled. The gall caused the big damage on the tree *Q. ilex* case *Plagiotrochus ameniti*. We noted that is the firstly time the gall species *Plagiotrochus gibbosus*, *Plagiotrochus razeti*, *Plagiotrochus vilageliui* are mentioned in the continent of Africa. This study is contributed to known the first list of insects from Tafat forest, still virgin environment, and showed the relationship between the different species and the host plant. We noted that the Tafat forest is also subjected to action of anthropogenic which can disrupt flora and fauna in the time.

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