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Chemical composition of scent secretion from the dorsal abdominal scent glands in nymph of *Coridius janus* (Fabr.)

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ABSTRACT

Insects of many varieties have developed various modes of chemical and behavioral defensive mechanisms. When disturbed, many hemipterans release a pungent and volatile fluid with an offensive odour. These secretions may be used by the bugs as defensive substances. In the present investigation, identification of scent secretions of *Coridius janus* (Fabr.) and chemical composition of the scent secretion of larval abdominal scent glands. *Coridius janus* possesses abdominal scent glands in larvae. The extraction of scent secretion from larvae of *Coridius janus* was collected with the help of micro capillaries and subjected to analysis by Gas chromatographic and Mass spectra (GC-MS) and compared with authentic samples. The scent components from the larvae showed a seven peaks, in which six compounds are identified consisting of 5-iso-propenyl pentyl amine, 1- dodecane, n-tridecane, Indole-3-acetic acid ethyl ester, N-methyl-dodec-6,10-diene-amine and 6,10-dodec-dienyl acetate, remaining one peak is not identified.

Keywords: *Coridius janus*, larvae, abdominal scent glands, GC-MS, scent secretions

INTRODUCTION

Defensive glands are found in may orders of insects and occur on virtually all part of the body i.e., in the head, thorax, abdomen and often in more than one of these parts at the same time. The scent glands are known to occur in various orders of insects like Heteroptera, Hemiptera, Lepidoptera, Coleoptera, Hymenoptera, Diptera, Orthroptera, Dermoptera and Isoptera. Those glands which are confined in thoracic region are known metathoracic scent glands or repugnatorial glands or metasternal glands or stink glands or ventral glands while in the abdominal region of larvae are called abdominal scent glands or stink glands or odoriferous glands. The chemical composition of scent secretions of Heteropteran bugs have been briefly reviewed. These glands are in the abdominal region are called abdominal scent glands or odoriferous glands.

The abdominal glands are exclusively present in larvae. But however sometimes a pair of abdominal scent glands are present in adults too. The study of abdominal scent glands of the larvae of certain hemiptera have been reported (Puri, 1924; Usinger, 1938; Aldrich *et al.,* 1972. Janaiah, 1978; Dhiman, 1985; LeelaKumari, 1985, Aldrich, 1988, Vidyasagar, 1995; Srinivasulu *et al.,* 1996). The secretion from the abdominal scent glands mainly constitute hydrocarbons, and aliphatic aldehydes, esters, ketones etc, (Butenandt and Tam, 1957). Brindly (1933) gave an extensive account of scent apparatus in number of families (Naucoridae, Notonectidae, Corixidae, Acanthidae, Corridae, Myodocidsae, Pentatomidae, Coreoidae, Lygaeidae and Capridae). A comparative morphology of scent apparatus and reference to phylogeny of some stink bugs have been studied (Ahmad and Ali Kazmi, 1976). Moody (1930) described the abdominal scent glands of a larva, Anasatristia De Geer. These glands had two thick walled orange coloured sacs which opened to the dorsal surface between fourth to six segments and acted both as gland and reservoir. These glands were mainly consisted of three layers. Aldrich (1998) reported that the secretion of larvae had rich in C6, Cg and also Cio alk-2-enals. Complex lipo-proteinous dark bodies were also observed in the cytoplasm of the stink gland cells. These were perhaps the pigment granules which after being bleached with H2O2 pick up sudan black, B. Acid Leematin and H, BPB stains (Neelima Kumar and Kumar, 1993).

Chemical composition of scent:

At present a large number of unique natural compounds mainly aromatic hydrocarbons of benzene derivatives like alchols, aldehydes, ketones, mixture of aldehydes, esters, ketoaldehydes, phenols are identified in the secretion of the defensive glands of various insects (Baggini *et al.,* 1966; Baldwin *et al.,* 1971; Janaiah 1978; Jackson, 1983; Leelakumari, 1985; Surender, 1988 Vidyasagar, 1995; Srinivasulu *et al.,* 1996). Identification and isolation of formic acid from ants (Wray, 1670) initiated the research efforts for identification and analysis of large number of unique compounds of defensive secretions of many Arthropods.

In recent years, research efforts in this field have greatly been identified. The chemical composition of many secretions is now known. These chemical composition is analysed by Gas liquid chromatography (GLC) and mass spectrometry (MS). Most of the scent compounds in certain insects are saturated and unsaturated aromatic hydrocarbons of benzene (Baggini *et al.,*1966). Recently, different chemical components have been identified from different glands of some insects and this difference was not shown for unrelated functions. The scent secretion produced from the scent glands are not only confined to the terrestrial insects but also present in aquatic species of heteroptera. The saturated hydrocarbon n-tridecane has been reported from the scent gland secretions of the rice stink bug, Ocbalus pugmax (Blum *et al.,* 1960). The characteristic stink of three pentatomidae bugs was shown to be largely due to a mixture of aldehydes and trans-2-hexenal, one of the major components of scent of stink bugs (Waterhouse *et al.,*1961: Ishiwatari. 1974). In nine adult bugs of coreoidae have shown either n-hexenal or n-hexyl acetate or both (Waterhouse and Gilby, 1964). In addition to aldehyde some pentatomidae bugs contain dodecane and tridecane (Surender, 1988).

The scent gland complex of adult milk- weed bug, *O. fasciatus* secreted acetates. The dorsal abdominal scent glands of larvae of *O.faciatus* have Oct-2-en-1-ol. The acetates are reported to be male specific (Games and Staddon, 1973). The cuticular hydrocarbons of *O. fasciatus* consisted of n-alkanes 3-methyl alkanes, internally branched monomethyl alkanes and dimethyl alkanes (Jackson, 1983). *Cyclopelta siccifolia* Recently Vidyasagar (1995) has been reported the various chemical components in n-dodecane, n-tridecane, hexyl hexanoate diethyl phthalate, these four compounds. Identified from the abdominal Scent glands of *H. dentatus*. (Srinivasulu *et al.,* 1996). Trans-hex-2- enal, n-dodecane, trans-hex-2-enyl butyrate, n-octyl acetate these chemical compound have been identified in the abdominal scent secretion of *C.purpureus* (Janaiah *et al.,* 1988). Trans-oct-2-enal, n-tridecane these two compounds from abdominal Scent Secretion of *T.Javanica* have been reported (Janaiah *et al.,* 1979) Iso-butyric acid has been identified as the major components of scent glands secretion from a heteropteran bugs. *Rhodnius prolixus* (fam:Reduviidae) which was probably neither sex nor species specific and as defensive against predators (Pattenden and Staddon, 1968 and 1972), the same compound previously identified from the neck gland of larvae of several swallow tail butterflies (Eisner and Meinwald, 1965; Eisner *et al.,*1970) and in defensive secretions of several carabid beetles (Schildecht *et al.,* 1968). The mating pairs of *Rhodnius prolixus* released a chemical substance which both attracted and sexually stimulated solitary males (Baldwin *et al.,* 1971).

A brief survey of Literature shows that there is a Lacuna on histomorphology and identification of Chemical compounds from the abdominal scent glands of *coridius janus*. In order to understand the significance of Scent secretions, in the present investigation, the histomorphology and identification of scent secretions from larval scent gland of *C.Janus* have been carried out.

MATERIALS AND METHODS

Collection of scent secretion from larvae: Fourth and fifth instar stage of *Coridius janus* were collected and reared on the leaves and young shoots of their host plants *Caccinia grandis* L., (Cucurbitaceae) and *Prosopis juliflora* (Mimosaceae). The larvae were grasped between the fingers and dorsal side was examined under a dissecting microscope. The tergal plates of larvae bugs were gently pressed and they released a yellow colored scent from the openings. The micro capillaries were placed against the openings of second and third abdominal glands (Fig.6). The scent gland secretions were collected into micro capillaries from abdominal glands pooled into a tube. The tube was sealed and stored in the deep freezer till it is required for chemical analysis by Gas-Chromatography and Mass spectrometry (GC-MS). Altogether 50 to 70 larvae were required for collection of scent. Gas-Chromatography (GC) and mass spectrometry (MS):
GC-MS method is used in recent years for the separation of mixtures of organic compounds of different classes. The GC-MS can be used to separate any compounds that can be vaporized without decomposition. The GC-MS has three advantages over other forms of chromatography. Separation can be made a much shorter period of time, the samples that required was only in 0.2-0.5 l and GC-MS results and data comes simultaneously without any delay. Automated GC-MS Unit: Scent secretions of larvae and adults of *Coridius janus* were carried out on the GC-MS data were obtained on a Shimadzu QP-2000 instrument at 70 eV and 250C. GC Column: ULBON HR-1 (unless otherwise specified) equivalent to OV-1, fused silica capillary - 0.25 mm x 25 M with film thickness 0.25 micron. The other conditions are given on the GC-MS trace. An entry such as 100-6-10-250 means that the initial temperature was 100°C, for 6 6 minutes and then heated at the rate of 10°C per minute to 250°C Carrier gas (helium) flow: 2 ml per minute.

The samples (unknown and authentic) of 0.3 ul to 0.5 ul were injected through sample boat; the column was held at 10°C for one minute, programmed for 10°C 250C at 6'C / minute and then held at 250C for 25 minutes. All the spectra were run at 70ev at source temperature of 250°C (Manifold temperature).

RESULTS

In *Coridius janus* the scent secretion is liquid form, volatile and highly concentrated which was collected from the abdominal scent glands of larvae and metathoracic scent glands of adults. The scent secretion was analysed by Gas-chromatographic and Mass spectra (GC-MS) and compared with authentic samples. The GC-MS data were obtained on a Shimadzu QP-2000 instrument at 70 ev and 250°C. The GC-MS analysis of scent secretions from abdominal scent glands of *Coridius janus*, showed a chromatogram consisting of seven main peaks (Table 1, Fig.1;). Majority of the peaks were obtained with good intensity.

Table 1 : GC-MS Identification of the components of Larval scent glands secretion of *Coridius janus.*

Peak No.	Components	Molecular weight	Masses of ions in order of abundance
1	Unidentified	97	43,45.57(Base peak),73,83 and 88
2	5-isopropenylpenyl amine	127	41 (Base peak), 42, 43, 55, 57, 70, 83, 93, 95, 97, 98 and 111
3	n-Tridecane	184	43 (Base peak), 57, 71, 85, 98,99 ,112, 113, 126, 127,140, 141 and 180
4	1-Dodecane	168	41,43 (Base peak), 55, 57, 68, 82, 83, 95, 96, 97, 109, 110, 111 and 123.
5	Indole-3-acetic acid ethyle ester	203	41, 57 (Base peak), 91, 117, 129, 145, 153, 173,182, and 202.
6	N-methyl dodec 6,10 diene amine	195	41,55,66,83,95(Base peak),125,167 and 182
7	6,10-Dodec dienyl acetate	224	41,55,67,95 (Basepeak),111,123,125,139, 167,180 and 195

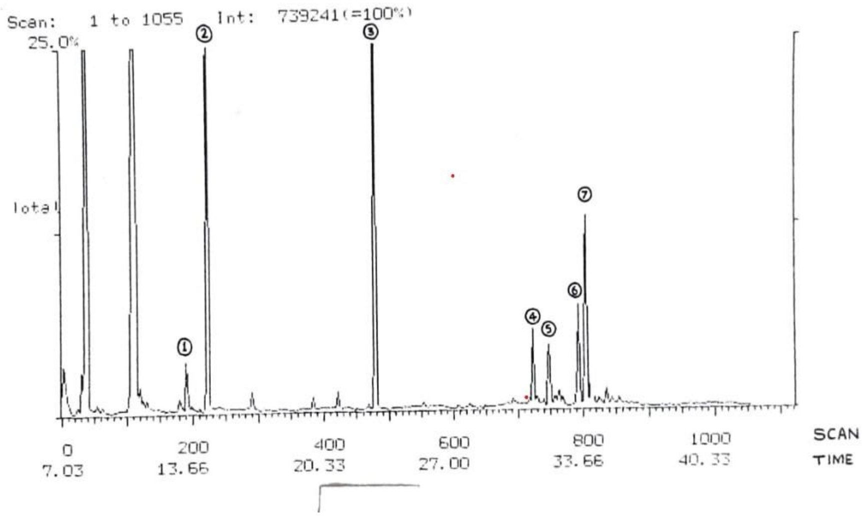


Fig 1. GC-MS data of Croidius janus (Larvae)

Peak 1: Unidentified
Peak 2: 5-Isopropenyl pentyl amine
Peak 3: n-Tridecane
Peak 4: 1-Dodecane
Peak 5: Indole-3-acetic acid ethyl ester
Peak 6: N-methyl dodec-6,10-diene amine
Peak 7: 6,10-Dodecdienyl acetate

Peak: 1 Unidentified (Fig.1)

Peak: 2 The mass spectrum of peak-2 showed the molecular ion(M) at M/Z 127 with low intensity. The base peak of the spectrum appeared at m/z 41, due to isopropenyl cation resulted from the molecular ion directly. The compound was identified at 5-isopropenyl pentyl amine. Other peaks presents at 42,43,55,57,70,83,93,95,97,98,111 are very well agree with the structure of the compound (Fig. 1).

CH3
|
CH2=C-CH2-CH2-CH2-CH2-CH2-NH2

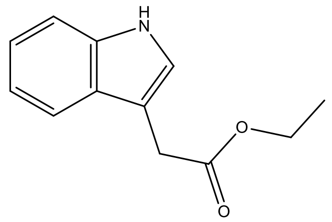
Peak: 3 It showed the mass spectrum with molecular ion at m/z 184 and the base peak appeared at m/z 43. The compound was identified as n - Tridecane. Other prominent peaks are shown at m/z 57, 71, 85, 98, 99, 112, 113, 126, 127, 140, 141 and 184 (fig.1)

CH3-(CH2)11-CH3

Peak: 4 It showed the mass spectrum with ion intensity of molecular ion (M) at m/z 168 and the base peak appeared at m/z 43. The compound was identified as 1-Dodecene. Other prominent peaks are shown at m/z 41,55,57,68,82,83,95,96,97,109,110,111 and 123 (Fig.1).

CH3-(CH2)9-CH=CH2

Peak: 5 It showed the mass spectrum with molecular ion at m/z 203 with low intensity. The base peak of the spectrum appeared at m/x 57, due to 3-vinyl indole moiety. The other prominent peak at m/z 117 is due to indole fragment. From the above cleavage pattern it gives an sample evidence that the compound is indole-3-acetic acid ethyl ester. The other peaks present in the spectrum are at m/z 41,91,129,145, 153, 173, 182 and 202 (Fig.1)

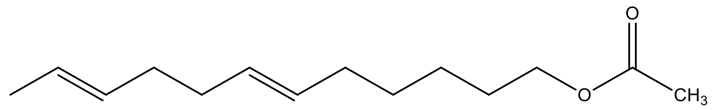


Indole-3-acetic acid ethyl ester

Peak: 6 The mass spectrum of peak-6 showed the molecular ion (M) at m/z 195. The base peak of the spectrum was due to 1, 5-hepta- dienyl cation which appeared at m/z 95. The compound was assigned the structure of N-methyl-dodec-6, 10-diene-amine. Other peaks were present in the spectrum are at m/z 41, 55, 66, 83, 125, 167 and 182 (Fig.1).

CH3-CH=CH-CH2 –CH2-CH=CH-(CH2)-NH-CH3

Peak:7 The mass spectrum of peak-7 showed the molecular ion at m/z 224 with low intensity. The base peak of the spectrum appeared at m/z 95, due to 1,5-hept dienyl cation resulted by the cleavage of molecular ion. It also showed the peak at m/z 41 due to propenyl cation. The other prominent peaksappeared at55,67,111,123,125,139,167,180 and 195. The compound was identified as 6-10-Dodec-dienyl acetate (Fig.1)



6-10 Dodec-dienyl acetate

DISCUSSION

When certain Hemipteran larvae and adults are irritated or disturbed, a pungent, yellow, highly volatile scent secretion is released into the atmosphere the scent secretion from the abdominal glands of larvae. The secretion contains broadly aliphatic aldehydes, ketones, esters, phenols, hydrocarbons, alcohols, amines, etc., The scent secretion may act as pheromones or defensive secretion. Most known pheromones influence the behavior of other individuals, but some affect physiology and on the other hand defense against enemies often involves the use of chemicals are toxic or deterrent. The physiological active scent secretions released by innumerable number of insects getting movementum of considerable interest in recent past to know the chemical nature of the scent, which is the mixture of numerous dazzling array chemical compounds. The specific function of these various chemical scent components of the pentatomid bugs are not thoroughly investigated.

A function of excretion was ascribed to them years ago and this hypothesis was supported recently by Lindsay (1969) and by Wynn and Boudreaux (1972) other authors for example Dixon (1958), and Brown (1975) believe that the cornicle secretion has a defensive value: Kislow and Edwards (1972) hypothesize that the cornicles emit an alarm secretion, a theory confirmed by Bowers *et al.,* (1972), and Wientjens *et al.,* (1973) who identified trans-B-farnesene in some aphids. Nault *et al.,* (1973) also demonstrate an alarm function of the cornicles.

Some coccidae Homoptera which produce a wax that, according to Meinwaldet. al. (1975), can exercise a deterrent action on arthropod predators are also quoted.

In the present study totally seven (7) chemicals are investigated and identified from the abdominal scent glands of the larvae seven abdominal chemical compounds could not be identified for non-availability of the authentic samples. In the abdominal secretions of the larvae out of seven compounds six are identified.

In the present investigation Indole 3-acetic acid ethyl ester, 6-10, dodec dienyl acetate and are two ester compound are identified in scent secretion of When the scent spilled on the human skin it caused a burning *C.janus*. sensation followed by the development of blisters which remained for a few hours (LeelaKumari and Janaiah, 1985). However, the secretion had lethal effect on the black ants (*Camponotus compressus* F.) and small red ants (*Monomorium gracillium*, S.). The secretion was pungent and highly suffocative and appear to be defensive in nature.

and trans-dec-2 enyl acetate are identified in the composition of the scent of the green vegetable bug, *Nezara viridula* (Gilby and Waterhouse, 1965). This compounds might be a sex-attractant odour (Butenandt and Tam, 1957).

Two esters (E)-2-hexenyl tiglate and (E)-2-hexenyl (E)-2-hexenoate, accounted for over 90% of the total volatile in the ventral abdominal gland secretion of male *Pachylis laticornis* (Aldrich *et al.,* 1982) the esters produced in *P.laticornis* constitute some types of pheromones. In atleast one species of pentatomidae (the southern green stick bug, *Nezara viridula*), males are responsible for the production an aggregation pheromone (Harris and Todd, 1980). Perhaps the male specific secretion of *P.laticornis* function as an attractant pheromone. Alternatively, or concurrently, the secretion could serve as a territorial marker or as a mating stimulant during court ship.

In scent secretion of *Coridus janus* contain Indol-3-acetic acid ethyl ester, 6-10, dedec-dienyl acetate. These two ester compound are irritants, when spilled the scent on the human skin it caused burning sensation followed by formations of blisters. So the scent from the second and third abdominal scent glands are defensive, protecting the insects from the predators.

In *cordius janus* have got 1-dodecane and n-Tridecane in the abdominal scent gland. These compounds are found in metathoracic scent glands of H. dentatus and also similarly identified in scent glands of rice Stink bug, which are partially protective (Blum 1985). Janaiah *et al.,* (1988) had also identified n-dodecane which was metabolically synthesized within the cells of second and third abdominal glands of larvae of *C. purpureus* and was demonstrated as defensive in nature. Surender (1988) had identified n-dodecane and n-tridecane in the metathoracic scent secretion and in the abdominal scent secretions of *H. dentatus*. tridecane a scent component was reported in Erydema rugosa, *E. pulchra* and *N. viridula* considered to be an alarm pheromone for other members of the same rather than a defensive secretion against their enemies.

n-tetradecane and n-pentadecane there two hydrocarbons reported in first and second abdominal gland secretion and posterior abdominal gland secretions of larvae of *Dysdercys intermedia* respectively. respectively. The scent gland secretion of the rice stink bug *Oebalus pugnax* is composed a liquid, the saturated hydrocarbon n- tridecan accounted of 60% of the secretion. In this, insect the ejection of scent can be either bilateral (or) unilateral ejection was most commonly observed. When the bugs were approached by imported fire ant workers (*Solenopsis saevissima*, *V richteri* Forel) ants which were exposed to the spray rapidly moved away. This would seem to support the belief that the odoriferous secretions of the pentatomid are atleast partially protective.

In the present investigation n-tridecane and 1-Dodecane are identified in the abdominal scent secretion of *Coridius janus*. These two compounds are irritants if spilled on the skin, it causes itching and burning sensation.

In the spider bug. *Podesus maculiventris*, the dorsal abdominal scent glands contained tridecane, (E)-2-hexenal, a few alcohols and traces of Trans and cis-pipertol and is a powerful attractant S-(-)-a- terpineol is inactive but not inhibitory and an effective artificial pheromone can bwe made by mixing (E)-2-hexenal and (+)-lenelool (!:2 volume ratio) (Aldrich *et al.,* 1984).

The trans-hex-2-enol and Cis-4-oxo-2-hexanol, the optical isomer of trans-4-oxo-2-hexenal is identified in the scent secretion of *C.siccifolia* (Vidyasagar, 1995), trans-2-hexenal is one of the scent component of the larvae functions as alarming pheromone. Ishwatari (1974) reported that trans-2- hexenal acted as an alarm pheromone for the larva of *Erydema rugosa*. Besides functioning as the alarm pheromone it plays a vital role in defense and a repellent due to its pungency to the predators as stared by Janaiah (1978).

The secretions of the abdominal scent glands of *Cimex lectularius* contained acetaldehyde, trans-2-hexenal, butan-2-one, trans-oct-en-1-ol and this secretion might be useful as an intra specfic alarm pheromone for larva and adults of both sexes (Levinson and Barilan, 1971).

Most chemical defensive secretions discharge from insects cannot be considered as a pheromone because they do not affect the behaviour of any other individuals of their own species (Butler, 1967). However, some defensive secretion eg. Fromic acid, released from the worker ants of *Formicafusca* against their enemies make the other individual of the same colony alert. Therefore, they are regarded as pheromone. Calam and Youdeowei (1968) showed that trans-2-hexenal and some other aldehydes, scent components of 5th instar larvae of Dysdercus intermedius, had alarm effect to both larvae and adults.

Aggregate formation of the I instar larvae of Eurydema rugosa was induced by both olfactory and tactile response rather than visual perception. The chemical stimuli responsible for the aggregation were derived from the scent components produced by the stink bugs themselves. These chemical substances were considered as "aggregation pheromone". Trans -2-hexenal, is one of the major components of the scent of *E.rugasa*, had role of "attractant" and "arrestant" the same aldehyde was reported to have an alaram effect for aggregating larvae of *R.rugosa* (Ishwiwatare, 1974). Therefore, trans-2-hexenal was considered to be not only the alarm pheromone but also the aggregation pheromone. In the present studies, aldehyde group of compounds are not identified in either abdominal glands of *Coridius janus*, but several aldehyde compounds are identified in number of pentatomid bugs. Benzyl alcohol, guaiacol, are aromatic volatiles identified in the abdominal gland secretion from males of the leaf fooled bug, *Leptoglossus phylopus*, the ventral abdominal gland secretion may act as along-range attractant of females by males in Heteroptera is an adaptation facilitating colonization of successional habits (Aldrich, *et al.,* 1976). So, 1,12, didecan-diola aromatic alcoholic compound present in adult *C.janus*, it is irritant, corrosive and helpful in protection from predators.

In present investigation 5-Isopropenyl penyl amines, and N-methyl dodec 6,10diene amine, are identified in the abdominal scent secretion of *C.janus*. For the first time these two amine compounds investigated and these are corrosive, toxic, and irritating. Valcurone Dazzini and Vita Finzi (1974) reported 5-hydroxy tryptamin in Chilopoda, histamine, found in Orthoptera, Heteroptera, Diptera and Hymenoptera, tri methylen di amines permine identified in scent secretion of Arameae the proper function of these amines in scent secretion is not yet discovered.

Stein (1966) studied the corresponding third gland of larvae of *Pyrrhocoris apterus* L. which produces a defensive secretion described as a colourless, volatile liquid with the characteristic "bug-smell". Remold (1963) believes in a defensive function of the glands, demonstrating experimentally that if the heteroptera are disturbed are disturbed with tweezers or attacked by ants they emit the secretion trying to direct it towards the source of disturbance. He showed in the laboratory the toxic paralyzing effect of the secretion on different insects and its repelling action on predators of Heteroptera. In addition, he demonstrated how the toxic components of the secretion, represented mainly by aldehydes penetratre the integument of the insects, favoured in their diffusion by tridecane. Tsuyuki *et al.,* (1965) show experimentally that the aldehydes present in the secretions of some pentatomids and coreids of Japan couse ants to die and consider them as defense substances. Schumaches (1971 c) reports that the secretion of Dysdercus intermediusans of *Pyrrhocoris apterus*, through having a contant poison effect on ants of the Formica and Lasius genus has no defensive power whatsoever against vertebrate predators. Levinson *et al.,* (1974) demonstrated that the secretion of the scent glands of the larvae and adults of *Climex lectularis*, partially chemically defined has a defense and alarm function. Remold 1963) assigned a defensive role also to the larval glands of Heteroptera. He reported that the larvae of certain Lygaeidae spray the secretion as a protective layer on their own tergum if attacked. Ishiwatari (1974) affirmed that the 2" and 3" instar larvae of their species of Pentatomids produce a secretion which has non-species-specification.

In the present investigation, when the scent secretion from the second and third larvae spilled on the skin, it caused burning sensation followed by formation of blisters which remained for a few hours and left a yellow stain on the skin. Blisters remained for 5 to 6 days and skin peeled off subsequently, so the scent from the second and third abdominal scent gland are defensive and protecting the insects from the predators. The chemicals responsible for corrosiveness in *C.Janus* are N-methyl dodec 6,10 diene amine, from larvae, remaining all chemicals are irritants from larvae. This similar observation was made by Youdeowi and Calam (1969) that the secretion of the 1st and 2nd abdominal scent glands are for aggregation and third has defensive role in *Dysodercus intermedius*, the scent constituents responsible for the aggregation, sex-attraction of the adults of *C.janus* are not investigated experimentally understudy.

CONCLUSION

Insects of many varieties have developed various mode of chemical and behavioural defensive mechanisms. When disturbed, many hemipterans release a pungent and volatile fluid with an offensive odour. These secretions may be used by the bugs as defensive substances. In the present investigation, identification of scent secretions of *Coridius janus* (Fabr.) and the chemical composition of the scent secretion of larval abdominal scent glands. The second and third gland reservoir muscles help in emitting the fluid from the reservoir.

The extraction of scent secretion from larvae of *Coridius janus* was collected with the help of micro capillaries and subjected to analysis by Gas chromatographic and Mass spectra (GC-MS) and compared with authentic samples. The scent components from the larvae showed a seven peaks, in which six compounds are identified consisting of 5-iso-propenyl pentyl amine, 1-dodecane, n-tridecane, Indole-3-acetic acid ethyl ester, N-methyl-dodec-6,10-diene-amine and 6,10-dodec-dienyl acetate, remaining one peak is not identified.

Conflict of Interest: The authors declare no conflict of interest in relation to this research.

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