

## · 疟疾防控专题 ·

# 云南省大理州消除疟疾后传疟媒介按蚊分布调查

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**摘要:** 目的 掌握大理白族自治州(大理州)12个县(市)消除疟疾后传疟媒介按蚊分布情况, 评估当地疟疾输入再传播风险, 为巩固当地消除疟疾成果和制定当地消除疟疾后防止输入再传播技术方案提供依据。方法 2017年7—9月, 将每县海拔分为高、中和低3层, 每层选1个自然村为调查点; 采用全通宵诱蚊灯捕蚊法和半通宵人诱捕蚊法, 在每个调查点的东、西、南、北、中各选取1间畜房或人房为观察点, 每月每个调查点连续3晚进行全通宵诱蚊灯捕蚊, 同时在低海拔调查点每月开展1晚半通宵人诱捕蚊。结果 2017年7—9月共捕获按蚊13种, 其中中华按蚊在12个县(市)均有分布, 微小按蚊仅在云龙县捕获, 昆明按蚊在祥云、剑川、宾川、鹤庆、洱源、巍山和大理7个县(市)有分布。全通宵诱蚊灯捕蚊法揭示, 按蚊密度最高的是祥云县, 为164.55只/(灯·夜); 半通宵人诱捕蚊法揭示, 仅在剑川和鹤庆县捕获到按蚊种类, 密度分别为0.72和0.06只/(顶·h)。结论 结合2018—2020年疟疾输入病例疫情, 大理市属于间日疟再传播风险市, 云龙县为潜在多种疟疾再传播风险县, 其他10个县均为潜在间日疟再传播风险县, 建议相关部门继续加强疟疾防控人员队伍建设及传疟媒介按蚊监测工作。

**关键词:** 疟疾; 媒介按蚊; 大理白族自治州

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## A survey of the distribution of *Anopheles* malaria vectors after elimination of malaria in Dali prefecture, Yunnan province, China

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**Abstract: Objective** To investigate the distribution of malaria vectors *Anopheles* after the elimination of malaria in 12 counties and cities in Dali Bai autonomous prefecture (Dali prefecture), Yunnan province, China; to assess the local risk of imported malaria retransmission, and to provide a basis for consolidating local achievements of malaria elimination and formulating local technical schemes for preventing imported malaria retransmission after elimination of malaria.

**Methods** The study was conducted from July to September in 2017. According to the altitude, each county (city) was divided into high, middle, and low stratifications, and one natural village from each stratification was selected as the survey site. The all-night light trapping method and half-night human-bait method were used. One barn or human room in the east, west, south, north, and middle of each survey site was selected as an observation point. The all-night light trapping method was used to catch mosquitoes at each survey site for 3 consecutive nights per month, and the half-night human-bait method was used to catch mosquitoes at each low-altitude survey site once a month. **Results** A total of 13 species of *Anopheles* mosquitoes were captured, among which *An. sinensis* was distributed in all these 12 counties and cities; *An. minimus* was only caught in Yunlong county; *An. kunmingensis* was distributed in 7 counties and cities, i.e., Xiangyun county, Jianchuan county, Binchuan county, Heqing county, Eryuan county, Weishan county, and Dali city. The results of all-night light trapping method showed that Xiangyun county had the highest density of *Anopheles* mosquitoes (164.55 mosquitoes/light·night). The results of half-night human-bait method showed that only Jianchuan county and Heqing county had *Anopheles* mosquitoes caught, and the densities were 0.72 mosquitoes/net·h and 0.06 mosquitoes/net·h, respectively. **Conclusion** Considering the imported malaria cases in 2018–2020, Dali city is at risk of retransmission of *Plasmodium vivax*; Yunlong county is potentially at risk of retransmission of multiple malaria; the other 10 counties are all potentially at risk of retransmission of *P. vivax*. It is suggested that related departments should keep strengthening the team building for malaria control and the surveillance work of malaria vectors *Anopheles*.

**Key words:** Malaria; *Anopheles* vectors; Dali Bai autonomous prefecture

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大理白族自治州(大理州)历史上疟疾流行严重,全州12个县(市)1952—2020年共报告疟疾病例141 636例,通过几十年的努力,2004年出现最后1例本地感染疟疾病例(永平县),2015年4月大理州顺利通过省级消除疟疾考核认证。2017年7—9月,按照《消除后疟疾媒介调查方案》,在大理州12个县(市)开展消除疟疾后传疟媒介按蚊分布调查。现将结果报告如下。

## 1 材料与方法

**1.1 调查点选择** 根据每个县(市)的海拔数据,将每个县辖区分为高、中和低海拔3层,每层海拔间隔至少500 m,在每层选择1个适于蚊虫孳生、不少于100人的自然村作为蚊虫调查点,调查时间为2017年7—9月。

### 1.2 蚊虫采集方法

**1.2.1 诱蚊灯全通宵捕蚊法** 按照《疟疾防治手册》<sup>[1]</sup>方法,采用诱蚊灯全通宵捕蚊,在调查点的东、西、南、北、中各选取1间畜房或人房为观察点,每个观察点挂1盏诱蚊灯,从20:00至次日08:00,连续诱捕12 h,每天早晨将集蚊袋取下,冷冻处死,按照《中国按蚊分类检索》<sup>[2]</sup>鉴定按蚊种类并计数;每个调查点每月连续调查3 d。

**1.2.2 半通宵人诱捕蚊法** 按照《疟疾防治手册》<sup>[1]</sup>方法,采用半通宵人诱捕蚊,在低海拔调查点的居民区与孳生地之间,悬挂1顶不开口的蚊帐,帐底着地,从19:00开始至次日01:00,1人坐于帐中,1人不停地捕捉停歇于蚊帐上的蚊虫,每小时捕捉15 min;调查结束后,将捕获蚊虫冷冻处死,鉴定按蚊种类并计数;每月开展1晚,连续开展3个月。

## 2 结果

**2.1 诱蚊灯全通宵捕蚊法按蚊种类组成** 共捕获中华按蚊(*Anopheles sinensis*)、微小按蚊(*An. minimus*)、昆明按蚊(*An. kunmingensis*)、须喙按蚊(*An. barbistris*)、须荫按蚊(*An. barbumbrosus*)、八代按蚊(*An. yatsushiroensis*)、赛沃按蚊(*An. sawadwongpormi*)、威氏按蚊(*An. willmori*)、伪威氏按蚊(*An. pseudowillmori*)、林氏按蚊(*An. lindesayi*)、多斑按蚊(*An. maculatus*)、淡色按蚊(*An. subpictus*)和库态按蚊(*An. culicifacies*)13种共36 131只,按蚊平均密度为22.30只/(灯·夜);捕获按蚊数量及密度最高的为祥云县,分别为22 214只和164.55只/(灯·夜);其中中华按蚊在12个县(市)均有捕获,微小按蚊仅在云龙县捕获,昆明按蚊分布在祥云、剑川、宾川、鹤庆、洱源和巍山县及大理市。见表1。

表1 云南省大理州疟疾媒介按蚊种类组成

Table 1 Species composition of malaria vectors *Anopheles* in Dali prefecture, Yunnan province

县(市)	诱蚊灯数(盏)	采集天数	按蚊种数(种)	捕获数量(只)				密度[只/(灯·夜)]	
				中华按蚊	微小按蚊	昆明按蚊	其他按蚊		
祥云	5	27	3	22 190	0	15	9	22 214	164.55
剑川	5	27	2	9 593	0	383	0	9 976	73.90
弥渡	5	27	3	1 448	0	0	4	1 452	10.76
漾濞	5	27	2	1 435	0	0	2	1 437	10.64
南涧	5	27	9	192	0	0	189	381	2.82
宾川	5	27	2	166	0	65	0	231	1.71
鹤庆	5	27	3	82	0	60	3	145	1.07
洱源	5	27	2	88	0	1	0	89	0.66
巍山	5	27	2	68	0	1	0	69	0.51
永平	5	27	1	45	0	0	0	45	0.33
云龙	5	27	4	40	2	0	6	48	0.36
大理	5	27	2	33	0	11	0	44	0.33
合计/平均		324	13	35 380	2	536	213	36 131	22.30

**2.2 半通宵人诱法捕获按蚊种类** 在剑川县沙溪镇甸头自然村捕获中华按蚊6只、昆明按蚊7只,密度为0.72只/(顶·h);在鹤庆县黄坪乡龙华自然村捕获昆明按蚊1只,密度为0.06只/(顶·h),其他10个县(市)未捕获到按蚊。

## 3 讨论

查阅大理州历年的按蚊调查资料及相关文献发

现,1959—2006年均采用吸蚊管人工捕蚊法、2007—2009年采用灯诱捕法,12个县(市)共捕获按蚊38种,中华按蚊为12个县(市)优势种,微小按蚊主要分布在鹤庆、南涧、弥渡、永平和云龙县,昆明按蚊分布在剑川、鹤庆、巍山、弥渡、祥云、永平和云龙县及大理市<sup>[3-4]</sup>。本次调查仅捕获按蚊13种,其中南涧县按蚊种类最多,中华按蚊12个县(市)均有发现,

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水率与胶饵起始含水量、保湿性能有关,而适口性除了与含水量有关外,还与胶饵中其他成分如引诱剂、促食剂、防腐剂、防霉剂、保湿剂等的种类与配比密切相关。总之,胶饵的适口性是胶饵中多种成分的综合体现,不同胶饵之间可能存在不同程度的差异,也决定了胶饵对德国小蠊的防治效果。

利益冲突 无

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微小按蚊仅分布在云龙县,昆明按蚊分布在祥云、剑川、宾川、鹤庆、洱源和巍山县及大理市。引起按蚊种类分布差异的因素可能与近年来大理州各县(市)广泛使用化肥和农药以及水稻田面积缩小等有关。结果提示,大理州今后应进一步加强疟疾媒介按蚊监测。

2018—2020年,大理州12个县(市)近3年疟疾输入病例报告发现,大理市输入疟疾病例6例(间日疟1例、恶性疟2例、三日疟1例、卵形疟2例),祥云县1例(恶性疟),南涧县1例(卵形疟),结合本次疟疾媒介按蚊种类调查结果和国家消除疟疾后防止输入再传播技术方案<sup>[5]</sup>,大理市属于间日疟再传播风险地区,云龙县虽然存在多种疟疾媒介,但无输入性疟疾病例,属于潜在多种疟疾再传播风险县,其他10个县仅有传播间日疟媒介按蚊,且无间日疟病例输入,为潜在间日疟再传播风险县,建议相关部门继续加强疟疾防控人员队伍建设,加强监测,防止疟疾输入再传播。

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利益冲突 无

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